A Database Publication

THE MICRO USER

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Volume 8 Number 1 March 1990 £1.50

DEMON ON DISPLAY

Amazing graphic effects anyone can create

DICKIE BRICKIE

Super arcade challenge to type in and play

STRATEGY

Learning maths can be fun

BETT SHOW

All that's new in the world of education

REVIEWS

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Multistore
Digi-Sim
Armada
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Top-selling guide to the BBC Micro, Master, Archimedes series and A3000

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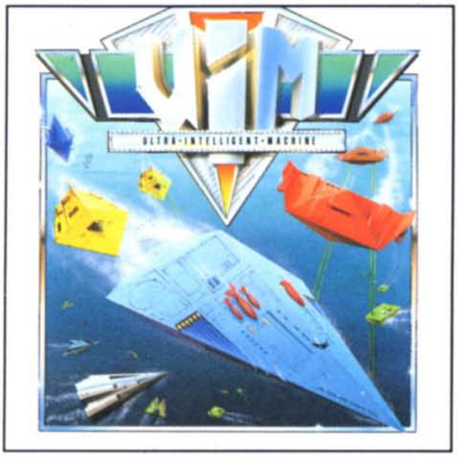
ARCHIMEDES
BBC MICRO
ELECTRON

THE 4TH



U.I.M.

U.I.M. is a massive 3D arcade adventure set in the future. 2 1/2 years of dedicated design and programming have produced this massive game. The "greenhouse" gases melted the icecaps and all life now exists in the oceans. There are over 65000 underwater ports each with their own colonies.

You must travel the oceans, trading in commodities, shares and currency. There are over 250 missions to complete before you will find your goal - the U.I.M. - created to be almost a god! Your craft is a highly manoeuvrable (and expandable) futuristic submarine named Black Satyr.

On your travels you will encounter many submarine types. Many of the most advanced and aggressive submarines do not appear until you reach later networks of ports. In addition you will also meet the Replicants - man-made underwater machines which have gone "renegade" and are capable of reproduction.

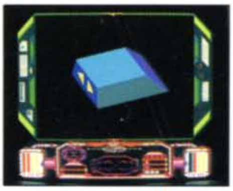
As you progress it is therefore essential to avail yourself of the highly sophisticated range of combat and defensive equipment available. The quest for the U.I.M. will be long and involved, the dangers intense, but the reward priceless!

U.I.M. is disc only and will run on BBC B or B+ with 16K of sideways RAM, BBC Master series and all Archimedes Computers.

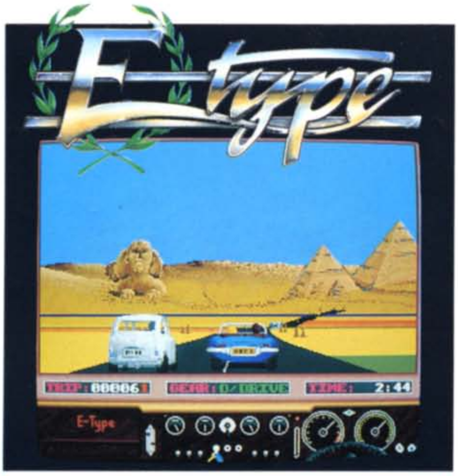
BBC

BBC

ARCHIMEDES



ARCHIMEDES



E-TYPE

Take control of £70,000's worth of gleaming "E-Type" and head off for the drive of a lifetime. Hear the digitised roar of the 5.3 litre 12 cylinder engine as you tear along lanes, motorways and desert tracks at over 150 mph.

"E-Type" takes racing simulations into the world of 32 - bit RISC processing and gives you smoother, faster and more detailed graphics than you are even likely to see in the arcades.

If you're new to driving you can take the easy-to-drive automatic for a spin but experienced drivers can optimise their performance in the faster 5 speed manual "E-Type". There are hazards galore including other cars, roadworks, trees, rocks, bushes, billboards oilspills, etc. etc.

"E-Type" has been produced by the highly acclaimed and experienced Gordon Key who also produced the best-seller Holed Out.

E-Type Designer

Design your own "E-Type" tracks with this highly advanced but simple to use designer. It is enormously flexible to produce an endless variety of tracks to challenge you and your friends. (N.B. You need the original E-Type in order to use this designer).

ARCHIMEDES

ARCHIMEDES

ARCHIMEDES

ARCHIMEDES

White
LEPRECHAUN
WHITE
TIME:2597
TITAN
IN THE BEG
(C) The 4t

WHITE MAGIC

White Magic is a unique arcade adventure in which you control 4 varied adventures:-

Kaldor the Leprechaun, Cheysul the Titan, Moriana The Warrior and Mandrake the Enchanter.

You can transform between all 4 characters at will and use their much needed special abilities.

It features 32 massive action-packed levels filled with aggressive guards and trolls, haunting ghosts and spectres, curious objects to find and use, and much more .....

White Magic is not a game for the faint-hearted; it is a fast-action game which requires fierce hand - to - hand combat and frantic weapon fire.

BBC

ARCHIMEDES

The Fourth Dimension

PRICES AND AVAILABILITY	ARCHIMEDES 31/2" DISC	BBC B/MASTER 51/4" DISC	BBC AND ELECTRON CASSETTE	MASTER COMPACT 31/2" DISC
U.I.M.	29.95*	19.95	-	21.95
E-Type	19.95	-	-	-
E-Type Designer	16.95	-	-	-
The Olympics (6 Events)	19.95*	-	-	-
White Magic	19.95	12.95	9.95	13.95
White Magic 2	19.95	12.95	9.95	13.95
Holed Out	19.95	14.95	12.95	15.95
Holed Out Extra Courses 1	16.95	11.95	9.95	12.95
Holed Out Extra Courses 2	16.95	11.95	9.95	12.95
Holed Out Designer	19.95	-	-	-
Arcade Soccer	19.95	12.95	9.95	13.95

All the above Archimedes games will work on A3000, 310 and 400 series computers.

DIMENSION

ARCHIMEDES
BBC MICRO
ELECTRON

Magic
NNING...
Dimension

WHITE MAGIC 2

This includes 32 brand new and highly dangerous levels plus a complete level designer.

The level designer is a doddle to use and can be used to alter or design levels from scratch.

An extra invisible feature in White Magic 2 will really confuse our adventurers!

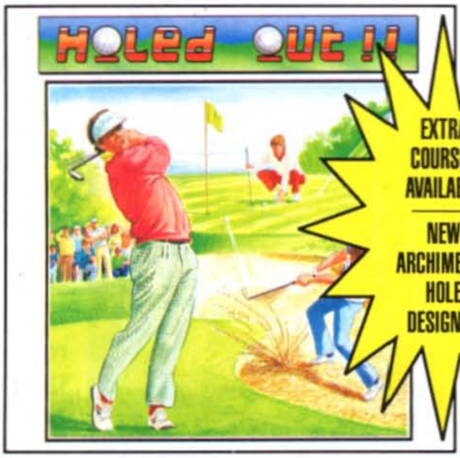
Reviews of White Magic

"The graphics are superb .... An absolute winner"
Electron User Golden Game August '89.

"Playability is good and I had to tear myself away in order to write this update review."
Archie review - The Micro User, October 1989.

ELECTRON

ARCHIMEDES



HOLED OUT

The most comprehensive, realistic and highly acclaimed golf simulation on the market today. This volume contains the original 2 contrasting 18 hole courses and comes complete with an easy to follow 16 page manual.

"I play golf and this game is the closest thing I've seen to the real game on a computer". *Archive, June 1989*

"I wouldn't have thought it possible to get a better simulation out of the beeb". *BBC Acorn User, June 1989*

"The 3D perspective graphics are stunning". *Electron User GOLDEN GAME June 1989*

"Holed Out is great ..... The game plays very well and the graphics are superb". *Popular Computing Weekly. March 1989*

"The Electron version is brilliant - it's almost the same as playing at Gleneagles. Unreservedly recommended". *A & B Computing Game of the Month, June 1989*

HOLED OUT EXTRA COURSES

In response to your many requests we have now produced 2 volumes of extra courses. Each volume contains 2 superbly designed brand new courses plus the original Holed Out program; therefore you do not need the original Holed Out to play them. Each course has been meticulously created to test your golfing abilities to the limits. The holes are very varied and even Nick Faldo would need to use his skills to keep up his recent record.

ARCHIMEDES HOLE DESIGNER

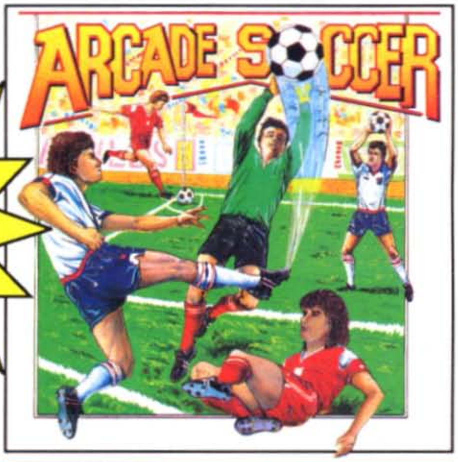
Create your own golf courses with this easy - to - use yet highly sophisticated hole designer. Its flexibility allows you to define all aspects of the holes from their pars to the position and size of the lakes. It will keep you enthralled for years.

BBC

ELECTRON

ARCHIMEDES

ARCHIMEDES



ARCADE SOCCER

Arcade Soccer really is football action at its very best.

Using an overhead view to make game play as exciting as possible it features everything that you could want in a football game. Corners, sliding tackles, throw-ins, goal kicks, dribbling, shooting, passing and much more. But not only does Arcade Soccer give you Total Action it also puts you in Total Control.

Firstly you can play with either keyboard or joysticks, against the computer and/or with up to 23 friends. The options are almost limitless; you can choose the skill of the goalkeepers, the speed and length of the game, play "friendlies" or tournaments and even enter the most coveted of championships - the World Cup.

"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment - and not a lot of games can do that. Value for money ... 10 out of 10". *The Micro User, October '89.*

ARCADE SOCCER
The Fourth Dimension
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The Fourth Dimension

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COVER STORY

FANTASTIC PRIZES in our 7th birthday competition. You could win one of our three major prizes worth a total of over £1,500:

Fancy learning how to fly? Or driving round a Grand Prix track? Or having a real bar football table in your own home?

These – and lots of other prizes – are waiting to be won.

Turn to page 64 to find out how you can win

Type-it-in

This symbol indicates that the feature contains at least one full length listing for you to key in on your micro.

Get it right!

All the major listings in this magazine are accompanied by checksums to help you key them in correctly.
For full details of how to use them see the article on page 72 of the February issue.

MICRO USER CLASSIFIEDS

The best bargains in the world of the BBC Micro come from fellow readers of The Micro User. Turn to **Page 104** to find just what you're looking for – from cheap modems to complete computer systems.

Education

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Up to the minute news of the BBC Micro in the world of education.

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A first look at some of the latest products for the classroom.

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27 Stratagem ✱
Make learning maths tables fun with this exciting strategy game.

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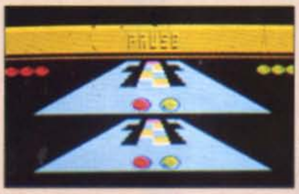
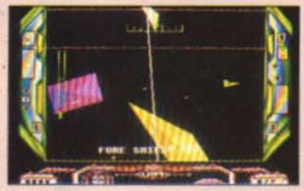


Enterprising two-player excitement

Getting the blues on Hall Street



In search of the Ultra Intelligent Machine

Can't go wrong here

Sphere of Destiny from the Fab Four compilations

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Explore a new whole world of moving pattern generators.

99 Dickie Brickie ⊛

Great graphics and fast arcade action for you to type in and play.

29 Education Reviews

Six pages of the best in software for the BBC Micro series in schools.

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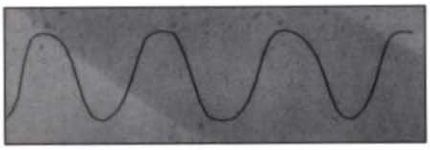
Another look at how desktop publishing is embracing the classroom.

Reviews



66 Multiple I/O

Video digitiser, converters, sound sampler and serial port: All in one.

73 Digi-Sim

We analyse the circuit designer that makes light work of learning logic.

102 Multistore

A complete system for building databases put through its paces.

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Amazing offer!

For the price of a just one year's subscription you will get 15 months of *The Micro User* plus the disc or tape for each issue. In addition you will get the disc or tape from the month you take out your subscription.

That's a grand total of 15 magazines and 16 discs or tapes – and you pay no more than you would for only a standard 12 month subscription!

THE MICRO USER
THE MICRO USER

What you'll find on this month's disc or tape:

- All the listings from this issue.
- More holes for GOLF!

For the Archimedes and BBC A3000 only:

- New, full colour Arc-Roids game.
- Amazing single-cell patterns.
- Whole screen Demons.

Take out a subscription NOW by filling in the form on Page 129.

One micro for 400 pupils:

The dilemma facing many teachers is discussed in our Education Special in next month's

THE MICRO USER

33p would hardly buy a ¼ pint of your favourite ale...

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News BEAT

March of the micro speeds up

MICROS can now be found in more than a quarter of British homes and public attitudes have shown a marked swing towards greater acceptance of information technology.

This is revealed in a major survey carried out by MORI (Market & Opinion Research International) and commissioned by Computer Management Group, Europe's largest independent management and IT consultants.

Although home ownership of micros has risen dramatically, serious use of those machines is not so high. Not surprisingly, games are the most popular use with 70 per cent opting for simple shoot'em ups and 26 per cent going for the more serious games.

Twenty six per cent of owners use a word processor, 13 per cent do their accounts on a micro, 11 per cent use a database, 10 per cent prepare graphics, and six per cent use spreadsheets and design applications.

Most dramatic changes are shown in schools. In 1982 less than one out of eight British primary schoolchildren used a micro at school but today this proportion has risen to three quarters. Half of Britain's secondary pupils used micros at school in 1982 but today nearly nine out of ten do so.

The report, called IT into the 1990s, was commissioned by CMG to celebrate its 25th annivesary. It was designed to gain a fuller understanding of the general role of information technology in society and business.

To prepare the report, MORI interviewed 2,047 members of the general public face to face, 500 senior managers by telephone and also spoke to 32 specialist journalists. CMG can be contacted on 01-630 5355.

New OS rom aids software developers

ACORN has brought out a new operating system rom for the Master 128, aimed at programmers and professional software developers. Incorporating a number of new features, it is claimed the new rom will run virtually all software written for the standard rom without modification.

Among new features is its ability to handle extended alphabets, making it particularly suitable for users requiring foreign language facilities.

The rom can handle characters in 8 bit as well as 7 bit format which provides more flexible use of extended alphabets both within the rom and from another sideways rom.

Keyboard translation can also be passed through any international keyboard sideways rom providing support for alternative character sets and keyboard layouts.

Other new features include improvements in ADFS floppy drive access and full use of additional 6502 second processor memory. Supplied with a short user guide, it costs £44.85.

Doctors turn to the Arc

ACORN's Archimedes has played a vital part in the development of a medical unit to spearhead the fight against lung disease.

The Pulmonary Function Diagnostic Unit has won the 1989 Smart Award presented by the DTI.

It was designed by Glasgow-based Dedicated Medical Systems which received a trophy and a £12,500 cheque from the DTI. This will be followed by a further £37,500 over the next year to fund further development with the opportunity of earning another £50,000 in the following year.

Dr. John Jackson of DMS, seen here receiving the award told *The Micro User*: "The Risc-based Archimedes has proved to be the ideal choice of computer for this project. "It is the only machine on the market which offers the processing power, speed and graphics capabilities which the complex nature of this work requires". The new unit is aimed at helping professionals dealing with both the prevention and cure of many types of lung disease by allowing close monitoring and analysis of the respiratory system of patients, particularly after surgery.

In a preventative role, the equipment provides important assistance in the early diagnosis of serious conditions allowing precautionary measures to be taken to avoid the development of serious illnesses.

A3000 link to 8 bit micros

Morley Electronics (091 257 6355) is set to revolutionise the A3000 add-on scene with its new fully compatible analogue/user port internal card available from the end of January.

This new product, providing the 32 bit machine with BBC Micro port compatibilty, marks the company's aggressive attack on the Risc market.

BEEBUG

The Archimedes Specialists

Beebug Hardware Upgrades for the A3000 and Archimedes

BEEBUG
Hard Drives for the 400/1 series

The BEEBUG internal hard disc upgrades use only high quality mechanisms from respected manufacturer's such as NEC and Seagate. All our drives are easy to fit.

☐ All drives have an access time of less than 29ms
☐ 40 & 50Mb drives feature autoparking
☐ Full 12 months warranty
☐ 50Mb drive uses the top of the range Rodime drive used in the Archimedes 440/1
☐ All drives fully tested
☐ Free fitting (by appointment) if brought to our showroom
☐ Backed by the resources of Beebug
☐ Full fitting instructions included

0120	**Beebug A400 20Mb Drive**	**£182.57**
0121	**Beebug A400 40Mb Drive**	**£291.26**
0122	**Beebug A400 50Mb Drive**	**£456.48**

BEEBUG
A3000 Memory Upgrades

The BEEBUG A3000 memory upgrades are available in either 1 or 3 Mb versions and are easy to fit by the user. This will give a total of either 2Mb or a massive 4Mb of memory.

By using the latest surface mount technology we have achieved a board size of a mere 256x46 mm.

The 1 Mb board can be easily upgraded to 3 Mb at any time by the user, unlike most other products.

☐ Easy to install with fitting instructions provided
☐ Full 12 months warranty
☐ 1 Mb expandable to 3Mb by the user
☐ Uses latest surface mount technology
☐ Free fitting (by appointment) if required

0130	**Beebug A3000 Memory 1Mb**	**£147.78**
0131	**Beebug A3000 Memory 3Mb**	**£365.17**
0132	**1Mb to 3Mb upgrade**	**£239.73**

BEEBUG
A3000 Disc Buffer

An exciting new release for the A3000 allowing the connection of 5.25" drives to the A3000. Some of the features include:

☐ Connector for BBC-type 5.25" & 3.5" drives
On board switches allow drive mapping to be changed. eg. The internal drive could be made drive 1, and an external drive as drive 0 - ideal for the PC emulator
☐ Whole interface contained on an internal card
☐ Easy to fit, supplied with full instructions
☐ Will work with most drives that have an internal Power Supply Unit.
☐ Can read DFS files with optional DFS Reader
☐ Internal and external drives can be set to double stepped
☐ Full 12 months warranty

0135	**A3000 buffer**	**£36.47**
0102	**DFS reader**	**£ 9.06**

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Archimedes 5.25" Disc Buffer MK II

A high quality buffer mounted neatly and simply in the back a 300 or 400 series Archimedes. Features:

☐ Almost any 5.25" drive with a PSU may be used
☐ Up to four drives (two external, two internal)
☐ Full buffering of signal from computer
☐ DIP switches allow re-mapping of drives

0795	**5.25" Buffer (305/310/440)**	**£28.91**
0784	**5.25" Buffer (400/1 series)**	**£28.91**
0102	**DFS reader**	**£ 9.06**

BEEBUG Serial Link Kit

A fast, convenient method of transferring data between the BBC Micro/Master and the Arch. A3000 users will require the A3000 serial chips.

☐ Transfer in both directions
☐ WIMP driven, easy to use software
☐ Compatible with both DFS and ADFS files
☐ Includes software, 3m cable and instructions

0796	**Serial Link Kit**	**£15.79**

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All prices exclude VAT. Please add £3 for P&P (£7 for hard drives). Prices and products subject to change without notice.

Silicon settles for Risc OS

SILICON Vision (01-422 2274) has hit the Risc OS trail with avengeance announcing many Risc OS versions of existing packages and increasing its range with five new programs.

GerberPlot is a complete Gerber driver for ARC-PCB and ARC-PCB Professional printer circuit board design packages producing electrostatic photoplotters. These plotfiles can be sent directly to photoplotter bureaux on Archimedes ADFS or MSdos disc formats to produce high quality PCB artwork. GerberPLOT costs £125.

DataVision is a fully featured relational database management system including label printing, reporting, word processing and mail merger facilities in one integrated environment for the Archimedes. It costs £99.95.

Financial Accountant is a complete integrated business accounting and database package which costs £175 and ShareHolder is a management system providing all the facilities needed to manage a share portfolio for £99.95.

OfficeTools is an automation system which includes mail merging, label printing, order processing, invoicing, accounting, share portfolio and business presentation. It costs £295.

Risc OS versions of other existing Silicon Vision programs have now been launched. SolidCAD Design Systems costs £99.95 in a new multi-tasking version and Realtime Solids Modeller costs £149.95. Both can be upgraded for £50. Film-Maker Risc OS costs £79.95 with a £10 upgrade charge and SolidTools costs £275. Existing users of any Silicon Vision products wanting to upgrade must return their old disc with the appropriate fee.

All about the Archimedes

NOW available is the spring edition of *Acorn Computing*, the updated official guide to products available for the Archimedes range and the BBC A3000.

Education is the main theme of this second edition, which has once again been produced for Acorn Computers by Database Publications. It includes features on desktop publishing in schools plus useful hints and tips on upgrades.

Acorn is distributing 10,000 free copies through its dis tributors and dealers, but members of the public can also buy *Acorn Computing* for £2.50 from Database Direct, Ellesmere Port, South Wirral, L65 3EB.

Also available is a special Archimedes utility disc which contains programs and demonstrations from major software houses such as Mitre Software and BrainSoft plus a full colour version of the popular Arcroids game previously published in *The Micro User*. The 3.5in utility disc costs £6.95 and includes a copy of *Acorn Computing*.

Cashing in

WRITING cheques on a regular basis can be a boring and repetitive task but small businesses, clubs and organisations can now enlist the help of BBC Micros.

Carious Software (091-285 0097) has launched Cheque, a suite of disc-based programs to facilitate the generation, printing and analysis of cheques. Used with Wordwise Plus, Cheque is available on 80 or 40 track Acorn ADFS

Snail mail gets an Email lift

THERE are some cases where the old and the new can be combined to excellent advantage and this is currently being shown by the MicroLink communications service.

Now fully operational is its Telemessages facility, where a message starts its life in the ultra-modern realms of electronic computer mail and ends up being delivered by the postman.

This Email start and snailmail finish is not the paradox it seems.

Allowing for the fact that not everyone has a telephone but everyone does have a postal address, it provides MicroLink subscribers with an even wider base for communication.

Users key in their message which is then transmitted to a post office in the recipient's area from where a print-out in an envelope is delivered to the door.

The service is aimed at that urgent message for a student son or daughter in digs, greetings for family and friends, get-well messages for elderly relatives and a host of other recipients who may not have telephones but need to be contacted with all speed.

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inmac

Power check

INMAC (0344 860606) has produced a new mains monitor which will identify voltage problems for computer users.

The hand-held device plugs into the mains and its LED displays show voltage variation under and over six per cent, supply dropout over two cycles and quantifies voltage spikes and transients. Price £115.

Basic courses come on disc

GOOD news for newcomers who want to learn programming on their BBC B but are bemused by manuals. Universal Computer Support (0922 30038) has launched a series of disc-based software courses, starting with Elementary Basic.

It includes 16 lessons with example programs on a double sided disc. In total there are 62 programs with a useful INFO file which states what the course is all about and helps the user find his or her way around. Each lesson has a minimum of ten screens with samples plus a final screen pointing to the corresponding software which follows.

As well as helping newcomers, the Elementary Basic course is aimed at seasoned programmers who need a useful reference source and at those who want to type in their own listings.

The full Elementary Basic course of four modules costs £20.95, modules one and two cost £10.95 and module one alone can be bought for £5.95.

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Diagnosis at a distance

SPEEDY diagnosis is vital when a badly injured accident victim arrives at hospital. The benefits of modern technology must be harnessed to the skills of doctors and consultants, but delays can have potentially disastrous consequences if the necessary expert is not immediately available.

Archimedes machines are now playing a life-saving role by making remote examination a cost effective reality

Linked to Siemens computed tomography body scanners, they can be used to send high definition monochrome images via standard telephone lines to a consultant's home or office or to any hospital in the UK.

Once transmitted and loaded into the memory of the micro, the images can be enhanced with electronic contrast and studied in close detail before the consultant rings in his diagnosis.

"The Archimedes 420/1 computer is the only machine that offers high speed image processing capabilities, ease of use and the flexibility for further hardware and software enhancements all at a cost which will allow the addition of multiple remote stations", said Keith Philips, computed tomography manager at Siemens.

Siemens' CT sales manager Derick Miller added: "Powerful, low-cost remote graphics workstations present a new dimension for users of Siemens scanners providing greater flexibility and convenience for doctors and consultants while giving patients valuable extra time".

As well as emergency diagnosis, the system allows important research image data to be accessed and shared between specialists studying diseases and disabilities.

Grabbed pictures cost less

PINEAPPLE Software (01-599 1476) has come up with a competitively-priced add-on for Archimedes users who want to grab full colour pictures from TV, video tape and video camera.

Its real-time video digitiser expansion board costs £285 and allows grabbed pictures to be displayed on the Archimedes monitor in full high-resolution colour.

Once on screen, the pictures can be zoomed in and out, stored on disc, printed or shown in different sizes and these features can be incorporated into simple Basic programs.

"The low cost of this device does not reflect poor quality, poor design or cheap construction", said Jim Daniels of Pine apple.

"The PAL decoder at the heart of the device which converts a coded signal from a VCR, TV tuner or camera into the R, G and B components is a very high quality design with both luminance and chrominance delay line to ensure the highest quality decoding.

"We have achieved the low cost simply by having low overheads, a smaller than usual profit margin and a desire to produce a high quality system which everyone who owns an Archimedes can afford".

Books aim at interaction

BOOKBINDER from Musbury Consultants (0706 216701) is an application for the Archimedes series allowing the creation of books which are multi-tasking interactive texts and graphics.

They are created by using the !Draw application which comes as standard with the Archimedes.

They can be used as multiple choice quizzes, programmed learning sessions, interactive fiction, interactive graphical display databases or presentation software. This is achieved by dragging icons, with no need to write any code.

Despite this simplicity, BookBinder is a powerful specialised programming language capable of producing a wide variety of books.

A simple use of books is to present users with a multiple choice question and provide responses to the answer given. Children are often encouraged to read by stories presented in interactive book form with the ability to decide the outcome of the story.

BookBinder is available in a single user form for £55 and costs £145 for a network licence.

VIEWLOK
Crowborough Instruments Ltd
Crowborough, East Sussex
OFF
ON

Snoopers locked out

CROWBOROUGH Instruments (0892 662078) has come up with a handy gadget for computer security. The viewlock is a key-operated double pole switch which is connected in place of the existing mains plug.

It disables the machine at the turn of a key and costs £22.42.

Exhibitions expand in Europe

DATABASE Exhibitions, which was responsible for the pre-Christmas record-breaking Computer Shopper Show at Alexandra Palace, has been taken over by the Blenheim Exhibitions Group.

Database was formed in 1982 by the Cheshire-based Europress Group and after five years growth was producing more than a dozen shows a year attracting more than 1,000 exhibitors and almost 200,000 visitors.

Two years ago it launched the International Desktop Publishing Show and this year it inaugurated the European Computer Trade Show.

Blenheim is Europe's leading independent exhibitions and conference organiser. Among its 200 European exhibitions and conferences are 70 based on information technology.

"Database will significantly strengthen our existing port folio of successful information technology events", said Blenheim's UK executive chairman, David Jones.

Potential

"There is clearly tremendous potential to accelerate the moves Database have already made into continental Europe by networking with our pan-European capability".

Managing director of Database Exhibitions Michael Meakin said: "Joining Blenheim will open up many new avenues for developing the company in the international computer marketplace.

The outstanding success of our first European Computer Trade Show underlined for us the importance of expanding into Europe and with 1992 coming ever closer we intend to capitalise on the increased export opportunities that are rapidly becoming available".

The present directors of Database Exhibitions will remain with the company.

Software industry aids charities

FRANK Bruno dropped in, Lenny Henry provided the cabaret and 330 guests from top companies in the computer leisure industry turned up to raise a record £27,000 for Variety Club charities at the annual industry dinner held at the Portman Hotel in London.

Voted a huge success by organisers from Activision, the InDin saw the inauguration of an auction which alone raised £18,000 and the announcement of the industry's awards for the year.

Top prize in the auction was a complete satellite broadcast system donated by NEC and bought by Peter Carver of Audiogenic who sold it on to raise even more money.

Other donations included offerings from Commodore, Bulletin 1000, Database, Magnetic Scrolls, Activision, Parkfield Communications, Virgin Mastertronic, Psion and CBS Records with credit going to the guests who made generous bids to keep the cash rolling in.

A Broadway Break holiday for two in New York donated by Virgin was raffled during the evening and won by Stewart Mathie of Multi-Media.

The leisure industry's accolades to itself, the Industry Dinner Awards, were greeted with enthusiasm.

Results were: 8 bit budget game – Postman Pat, Alternative; 16 bit budget game – Super Gridrunner, Llamasoft; 8 bit adventure game – Times of Lore, Origin; 16 bit adventure – Indiana Jones III, US Gold; 8 bit simulation – Stunt Car Racer, MicroProse; 16 bit simulation – Falcon, Mirrorsoft.

Eight bit arcade translation – Chase HQ, Ocean; 16 bit arcade translation – Operation Thunderbolt, Ocean; 8 bit arcade – Untouchables, Ocean; 16 bit arcade – Kick Off, Anco.

Journalist of the Year – Ciaran Brennan of The One; Magazine of the Year – The One, EMAP; Overseas award – Future Wars, Delphine; 8 bit sound/music – Turbo Outrun, US Gold; 16 bit sound/music – Xenon II, Mirrorsoft; 8 bit graphics – Myth, System 3; 16 bit graphics – Fiendish Freddy, Mindscape; 8 bit non-arcade translation – Batman, Ocean; 16 bit non-arcade translation – Batman, Ocean.

Programmer of the Year – Bullfrog for Populous; 8 bit original game – Myth, System 3; 16 bit original game – Populous; Best Advertisement – Fiendish Freddy, Mindscape. Software house of the Year – Ocean.

The award winning Electronic Arts team

Price drops

SINCE the Archimedes version of Signwriter was reviewed in the January issue of **The Micro User**, it has been reduced in price from £49.95 to £39.95.

The software allows text, logos and symbols to be printed in a wide variety of styles and sizes and comes from Wight Scientific (01-858 2699).

Arc gear on show

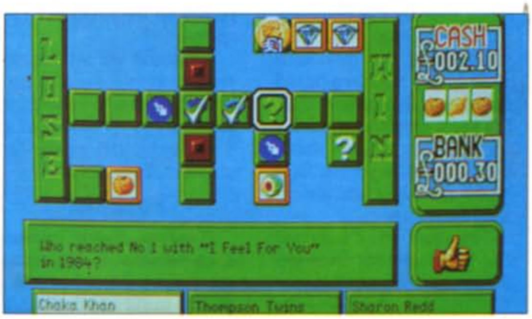
AIMING to bring as many Archimedes products as possible together under one roof, Cambridge International Software (01-833 4023) is to hold a Spring Fair at its headquarters on March 10 and 11. There will be no entrance fee for the event, which will be open from 10am to 6pm on the Saturday and 10am to 5pm on the Sunday at 8 Herbrand Street, London WC1.

Star turn at new quiz

SOCCER star Emlyn Hughes turned up for the kick-off of the latest offering from Audiogenic (01-861 1166) – Emlyn Hughes Arcade Quiz. The launch started at the Hoop & Grapes in Aldgate High Street then took guests on a bus tour of London ending up at The Hogs Grunt in Cricklewood.

Arcade Quiz is based on the popular trivia machines to be found in pubs, but incorporates the strategy of a board game. Questions cover pop & rock, sport, entertainment, arts & literature, people & places and pot luck.

Progress across the board is made more exciting with kickers which throw you off, blockers which open and close your path, zappers and blasters for blowing up question blocks, clockstoppers which freeze the scrolling track and superzappers for jumping forward.



Who reached No 1 with "I Feel For You" in 1984?

Chaka Khan

Thompson Twins

Sharon Redd

Spreading the good word

THE Micro User will soon be more widely available to blind and disabled people thanks to an ambitious drive by Talking Newspaper Enterprises.

For many years our news, features, reviews and listings have been taped for the blind, sight-impaired or those with such disorders as Parkinsons Disease which make it difficult for them to hold books. They have only been available on subscription, but the new initiative will put them into public libraries throughout the country.

A pilot study took in 26 outlets in East Sussex, and according to library project manager Mary Wilts, support has been overwhelming.

As well as East Sussex, Easter will see *The Micro User* available from libraries in Berkshire and Dorset with Manchester and Surrey to follow soon after. A series of awareness days is planned for library staffs to extend the scheme further.

Under the project, libraries buy copies of the tapes which are then available for lending to the public in the same way as books.

"I am certain it will be very successful", said Mrs. Wilts. "I have already had numerous telephone calls from people who have heard about the service and want to use it".

For further information contact Mrs. Wilts on 0435 22828

Hawk eye for the Arc

WILD Vision (091–281 8481) has launched a new real–time colour video digitiser for the Archimedes, the Hawk V9.

Risc OS–compatible, the card is double width and can be used to capture both still and moving pictures.

Frames can be saved as sprite images and then manipulated by the package, which also reduces 12 bit colour images to 8 bit for display. Price £557.

BEEBUG - THE ARCHIMEDES SPECIALIST

The NEW BBC Micro - The A3000

Ideal for home, education and business use, this powerful computer includes the multi-tasking Operating System - RISC OS; BBC Basic V and a BBC B emulator are supplied as standard. An optional PC emulator disc allows over 90% of DOS software to be used including Lotus, dBase III, MS Word and Wordperfect.

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Choose between the standard Acorn RGB monitor dressed in Acorn livery with an audio input or the Philips 8833 monitor with stereo sound and a video input. Both monitors offer similar picture quality.

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All new 400 series and A3000 computers purchased through Beebug include one years On-Site Maintenance. Should your machine fail an engineer will call at your home or place of work within 24 hours to repair the machine.

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Under this scheme you may purchase an Archimedes A3000 or 400 Series computer (base or colour) by an initial deposit and 9 payments at monthly intervals. There is no charge to you for this service.

The table below shows some examples of the repayments on various machines.

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410/1 Colour	155.85	147.00
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420/1 Colour	208.85	205.00
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If you wish to take advantage of this scheme please telephone us and we will send you further details. Finance over 12/24/36 months is also available.

FREE 40Mb HARD DISC DRIVE

Purchase a 410 with Acorn colour monitor and we will supply a free, high quality 40Mb Hard Disc with 28ms access time and autopark.The drive will be fitted and tested before dispatch. Please mention this offer when ordering.

For a limited period only

This offer is not available on 0% finance and is an alternative to the members offer listed below.

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A3000 - On Site Maintenance, Pacmania, printer lead, 10 x 3.5" discs & lockable disc box. Members using the 0% finance offer receive On-Site Maintenance only.

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420/1 - On-Site Maintenance, and items to the value of £167 (Entry system) or £180 (Colour system). Members using the 0% finance offer receive On-Site Maintenance,10 x 3.5" discs.

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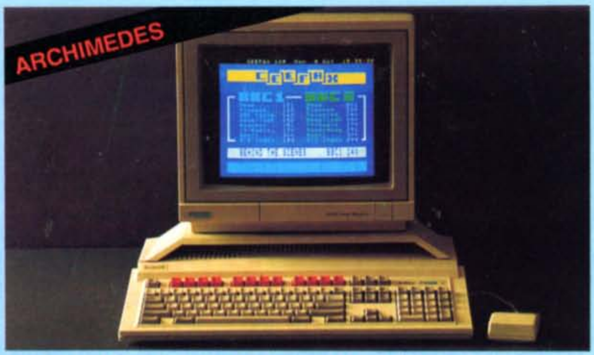

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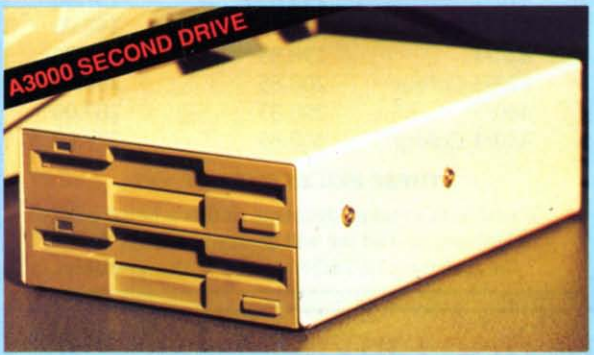

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(NOTE switching units & print buffers come with printer lead)

The Morley TELETEXT ADAPTER is now available for the Archimedes. The specification including screen dumps etc., is the same as the BBC version but connection is via a Podule socket. **£125**

EXISTING USERS OF OUR BBC TELETEXT ADAPTER
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We are now an Acorn dealer and service centre. If you would like to have a look at the A3000 or any other Acorn/Morley products please feel free to call in and discuss your requirements with our staff.

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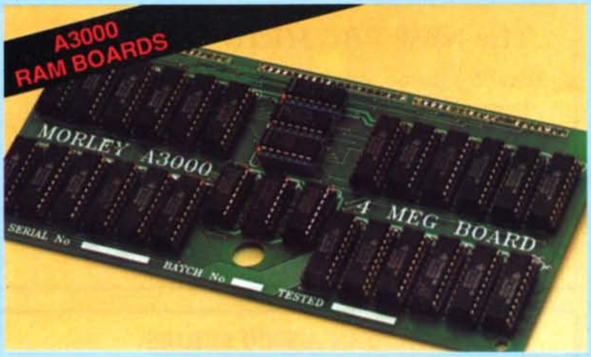
Analogue/User Port Podule

Combined BBC Analogue and User Port on an internal A3000 Podule. Fully compatible with Acorn's 300/400 Series BBC IO Podules. Suitable for EMU System or any application requiring analogue joystick



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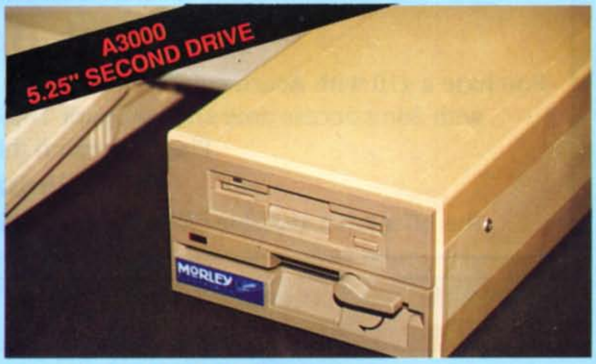

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Including SCSI Podule, drive, case and leads

20 meg **£465**	30 meg **£495**
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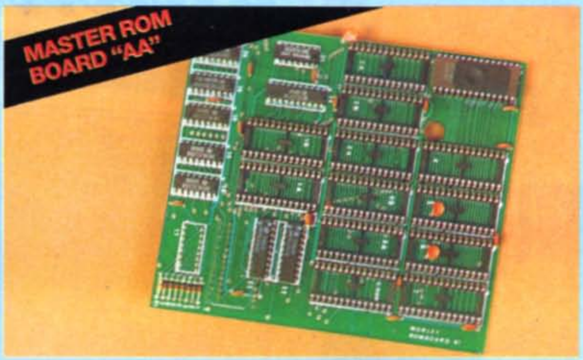
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single £89 **dual £169** **power supply add £20**

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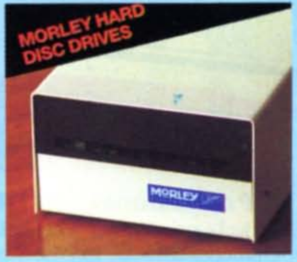
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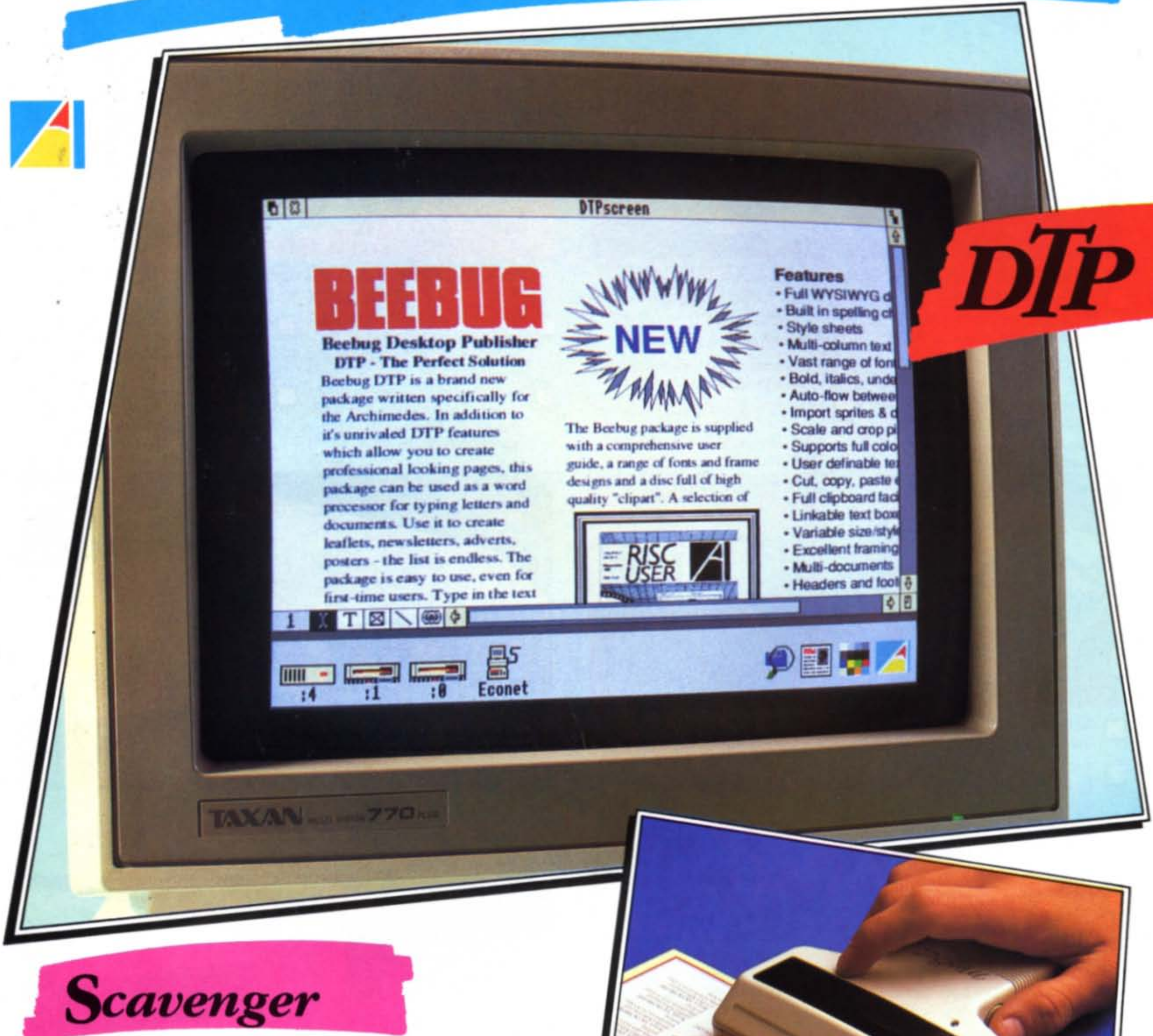
Visualise & realise,

DTP



DTPscreen

BEEBUG

Beebug Desktop Publisher

DTP - The Perfect Solution

Beebug DTP is a brand new package written specifically for the Archimedes. In addition to it's unrivaled DTP features which allow you to create professional looking pages, this package can be used as a word processor for typing letters and documents. Use it to create leaflets, newsletters, adverts, posters - the list is endless. The package is easy to use, even for first-time users. Type in the text

NEW

The Beebug package is supplied with a comprehensive user guide, a range of fonts and frame designs and a disc full of high quality "clipart". A selection of

Features

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- Vast range of fon
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- Auto-flow betwee
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- Scale and crop pi
- Supports full colo
- User definable te
- Cut, copy, paste
- Full clipboard fac
- Linkable text box
- Variable size/styl
- Excellent framing
- Multi-documents
- Headers and foot

:4 :1 :0 Econet

Scavenger

Professional 400 DPI Scanner

The Beebug Scavenger hand-held image scanner for the Archimedes adds life to DTP, Word Processing, Drawing and Painting, by enabling the incorporation of photographs and drawings into documents. The 105mm wide scanner features **true** 400 DPI resolution unlike most other hand-scanners currently available, where the 400 DPI is hardware generated from 200 DPI.

As you scan, the WIMP-based software supplied on the podule, displays images on the screen in real-time. Once scanned, these images can be cropped, scaled, flipped, converted into grey shades (to enhance photographs), transferred directly into other RISC OS applications such as DPT, ArcPaint and ArcDraw, or saved in a special compressed format to make the best use of disc space.

The package includes Scanner, half-width podule, built-in ROM software and a comprehensive user guide.

Price £173.04+VAT+£7 Carriage

SCAVENGER A4

A full A4 width 200 DPI scanner is also available with half-width podule, built-in ROM software and user guide.

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A4 Sheet feeder for SCAVENGER A4
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DTP + Scavenger, HARD DISC Companion + Hearsay, NOW from BEEBUG

Beebug Desktop Publisher – The Perfect Solution

Beebug DTP is a brand new package written specifically for the Archimedes. It has unrivalled DTP features which allow creation of professional looking pages for leaflets, newsletters, adverts, posters or use it as a word processor for typing letters and documents. The package is easy to operate, even for first-time users. Type in the text, specify the font, style and size, add headlines, import and scale pictures, move items to their final positions; the page you are creating is shown on the screen exactly as it will look when printed.

The Beebug DTP package is supplied with a comprehensive user guide, a selection of example documents, a range of fonts and frame designs, and a disc full of high quality 'clipart'.

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- Cut, copy, paste etc.
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Price £129 + VAT + £3 Carriage

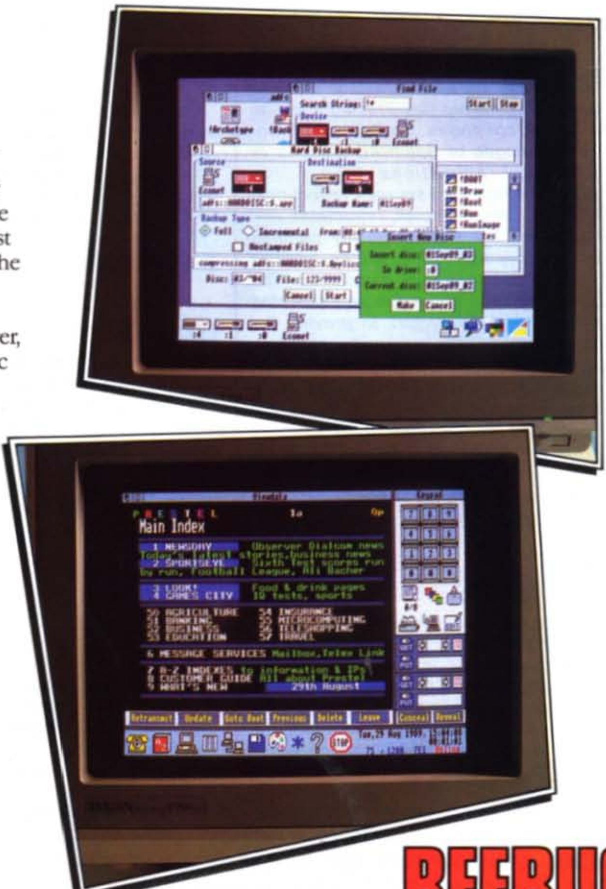
Available late 1989. Please write or phone for specification.

HARD DISC Companion

Essential Hard Disc Utilities

Hard Disc Companion contains an easy-to-use and reliable **'Backup'** facility which allows the contents of the hard disc or network to be saved onto floppy discs. Two types of backup are possible; **'Full'** saves every file on the hard disc to floppy, whilst **'Incremental'** saves only those files added or changed since the last backup. **'Restore'** is equally comprehensive allowing full, partial, or file-by-file restore from floppy disc. Hard Disc Companion also contains **'Spark'**, a file compressor and archiver, and **'Find File'**, a fast easy-to-use utility for locating files on disc or network.

Price £33.91 + VAT + £2 Carriage



Hearsay

The Definitive Communications Package

This exciting mouse-driven package takes communications on the Archimedes into a new league. It is ideal for use with Prestel, Telecom Gold and bulletin boards, and no technical knowledge is necessary. **'Hearsay'** provides extensive emulations of all the terminals you should ever need, including: VT220, VT102, Prestel, Tektronix and TTNS. File transfer protocols provided include: XMODEM, YMODEM, SeaLink, Kermit and ASCII. Other features include: telephone directory, call logger, capture buffer, viewdata editor, and line editor. **'Hearsay'** works with virtually all modems including Hayes and DTI. Modem leads are available for most makes of modems – please phone for details.

Price £60 + VAT + £3 Carriage

All details within this advertisement are subject to alteration due to continuing development and improvements.

All products require RISC OS and at least 1 MByte of RAM.

BEEBUG

Beebug Limited
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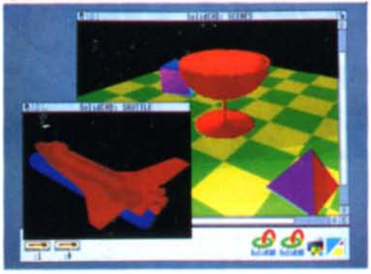
(0727) 40303 FAX (0727) 60263

SILICON VISION

SOFTWARE FOR THE ARCHIMEDES COMPUTER SYSTEM

SolidCAD



The next generation multi-tasking CAD package combining 2D Draughting and 3D Modelling techniques with advanced smooth shading and lighting effects to provide the ultimate 3D Draughting System for Architectural design, Interior design, Engineering design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D to visualise a model while it is being created. Powerful zoom, pan, sweep, extrude and macro facilities are also provided to enhance design productivity.

£99.95 (ARC) New

SolidsRENDER

The most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations taking into account multiple light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence. The high-speed ray tracer uses sophisticated colour mixing techniques to provide the maximum range of colour shades plus anti-aliasing for smooth edges, motion blur effects, dynamic viewpoint, variable camera lens for wide angle and telephoto effects and multi-colour light sources driving the Archimedes display hardware to its limits for the best photo-realistic images within the laws of optical physics.

£79.95 (ARC) New

SolidTOOLS

The fully integrated environment for 3D CAD, Animation, Rendering & Hardcopy. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your 3D Design and Presentation requirements.

£275.00 (ARC) New

RiscBASIC

The best BASIC V compiler money can buy. Here's what the reviewers say:

"If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC"
- RISC USER August 1989.

"In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. This will be an invaluable addition to every serious BASIC programmer's toolkit. My congratulations to Silicon Vision" - Archive June 1989.

"very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

"RiscBASIC wins the race...has the edge overall...more likely to provide the correct results" - BBC Acorn User Nov 1989.

"Still the only true BASIC V syntax compiler. If you want the best, buy Silicon Vision's complete answer"
- Micronet August 1989.

£99.95 (ARC) New

GerberPlot

The complete Gerber driver for ARC-PCB and ARC-PCB Professional Printed Circuit Board design packages producing Gerber plotfiles for driving Electro-static Photo-plotters. These plotfiles may be sent directly to photoplotter bureaus on Archimedes ADFS or MSDOS disc formats to produce the highest quality PCB artwork for professional results.

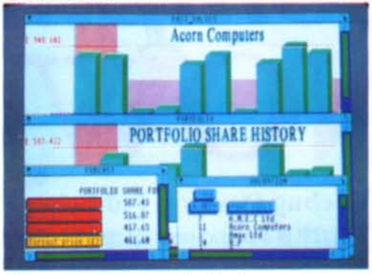
£125.00 (ARC) New

SuperPlot

The complete plotter driver for SolidCAD, Realtime Solids Modeller and Gate-Array Design System supporting the industry standard HP-GL, Graphtec, Watanabe and Plotmate plotters.

£29.95 (ARC) New

ShareHolder



The complete share holder's management system providing all the facilities needed to automate your portfolio. Features include Company statistics, Share holdings, Transaction processing, Portfolio history, Forecasts, Dividends due, Share price updates plus built-in Calendar, Calculator and Hardcopy facilities for total integration.

£99.95 (ARC) New

DataVision

A full featured relational database management system which also includes word processing, label printing, reporting, & mail-merging facilities in one integrated environment for the Archimedes, bringing professional quality business software to the demanding user. The database manager is rich in features and includes facilities for the production of complex queries, detailed reports, browsing, sophisticated relational data entry, relational reporting, interactive & global editing, formula entry and validation. All this in an intuitive easy to use mouse driven environment.

£99.95 (ARC) New

Financial Accountant

The professional business accounting and database package which includes DataVision together with turnkey applications for Order Processing, Invoicing, Sales ledger, Purchase ledger, Cash book, Stock management, Reporting, VAT returns plus year-end accounting complete in one integrated environment.

£175.00 (ARC) New

OfficeTools

The complete Office Automation system for Database management, Mail merging, Wordprocessing, Label printing, Order Processing, Invoicing, Accounting, Share portfolio, Forecasting, Dividends processing, Calendar, Calculator and Presentation graphics. Includes Financial Accountant, DataVision, ShareHolder, and the Presentation System providing a turnkey solution for all your business and management requirements.

£295.00 (ARC) New

All software run in native mode on A300-400 Series & A3000 with RISC OS. Enquire for our free product Catalogue

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All prices include VAT and Carriage (Overseas orders should add £4)

UPDATE

Unix bundle

ACORN Computers has brought in a special bundling deal on its Unix workstation aimed specifically at the education market.

The R140 Risc-based system is being offered with hard disc, Ethernet networking plus a choice of either PC emulator software and 14in Taxan colour monitor or a 19in Taxan mono monitor for £3,448.

"With our commitment to the X/Open and SVID standards and upgrades to future products, we believe that the R140 now holds the best price/performance position in the market today", said Acorn's product manager for the R140, David Slight.

"One of the intentions of this offer is to ensure that everyone has an opportunity to evaluate for themselves the performance and value for money the machine offers when part of an application solution".

Acorn has said the offer will be reviewed later in the year.

Questions answered

THE National Curriculum calls for a level of data collection and analysis which can cause headaches for school staff. Cambridgeshire Software House (0480 7945) claims the remedy lies in using uestionnaires and has launched a comuter program to help.

Called The Cambridge Questionnaire, it llows users to build and design a quesonnaire of up to 40 questions, print it, ather and enter the responses and analse the results. It has been written in such way that it is suitable for use in the seven 16 age range and to stimulate cross-curcular work.

Available for all Acorn computers, it is ing offered at a special introductory price £20.

Lessons begin at home

R parents who want to take a more ive part in their childrens' education, sma (0244 326244) has brought out a me version of its Play and Read prom. It is now available for the BBC B and ster at £22.99 and there are plans to duce both school and home versions he A3000 later this year.

Play and Read has proved so successn schools that the logical next step was ublish a version specially designed for home", said Trude Salisbury, senior ner at Prisma. "Play and Read still des five illustrated reading books and ory cassette in addition to the soft-".

alled Prof Plays a New Game, the e version features the character Prof helps children learn to read. It is d at parents who want to start the very g reading before they go to school or who want to back up school lessons elp at home.

Micro program for research lab

A PROGRAM which first appeared in *The Micro User* has been included in a secondary school software package released by the prestigious Rutherford Appleton Laboratory, the Science and Engineering Research Council's largest research establishment.

From its headquarters in Didcot, the laboratory has issued the suite of programs on floppy disc, free of charge to schools in Oxfordshire for use with BBC Micros.

To demonstrate three-fold symmetry it delved into the archives of *The Micro User* and came up with Kaleidoscope, a program which was featured in January, 1984, developed by Gwen and Roy Collier.

Among its many other functions, Rutherford Appleton is the base for JANET, the Joint Academic Network. An introductory program in the package explains the work of the laboratory and the different ways in which computers are used. This leads pupils to try out various programs which can also be accessed individually from a main menu.

Among its 15 programs, the package is structured to contain something of interest for everyone including such subjects as geography and poetry as well as more familiar applications for computers.

The package was the brainchild of Kate Crennell from the laboratory's Science Department Computing Group. Her idea started with a demonstration disc containing programs aimed at information technology students and centered on computing opportunities at Rutherford Appleton.

It was compiled mainly in her spare time but the laboratory's director was so impressed that he asked Kate to develop a package which covered the work of other RAL departments.

This latest initiative is part of the laboratory's increasing involvement in science education local schools. Both primary and secondary pupils are welcomed on educational visits to the Didcot base, work experience is offered to students and RAL staff visit schools in connection with a variety of educational schemes.

Rutherford Appleton Laboratory provides a wide range of experimental and support facilities to scientists and engineers working in higher education institutes in the UK and overseas.

Microvitec's new Cub 3000 monitor

New colour monitor for education

MICROVITEC (0274 390011) has added a new colour monitor to its range of computer equipment for the education market. The Cub 3000 incorporates components of the same type used Microvitec's widely used 1455 AMA2 which runs with both A3000 and the BBC Master and it is claimed to be the only monitor for the A3000 to have the popular and durable metal cabinet.

Ken Hardy, education business manager for Microvitec, said: "More than 300,000 Microvitec 1431 MS4 and 1451 MS4 monitors are working on the range of BBC Micros in schools around the country.

"With the A3000 now proving very popular, we are confident that both LEAs and schools will be looking for the same degree of reliability, quality and value in the monitor that they enjoyed from Microvitec throughout the Eighties".

The Cub 3000 costs £263.

Jet Fighter
£14.95

Sales Ledger
£64.95

Atelier
£99.95

Purchase Ledger
£64.95

Hoverbod
£14.95

System Delta &
Card Index (BBC) £64.95

Minotaur
£14.95

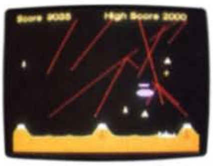
Home Accounts
£49.95

Orion
£14.95

System Gamma (BBC)
£49.95

Reporter
£39.95

Stock Management
£64.95



Missile Control
£14.95

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Freddy's Folly
£14.95

Ibix, The Viking
£19.95

Stock Management
(BBC) £45.95

Timetabler
£688.85

System Delta Plus (V.2)
£79.95

School Administrator
£149.95

Nominal Ledger (BBC)
£55.95

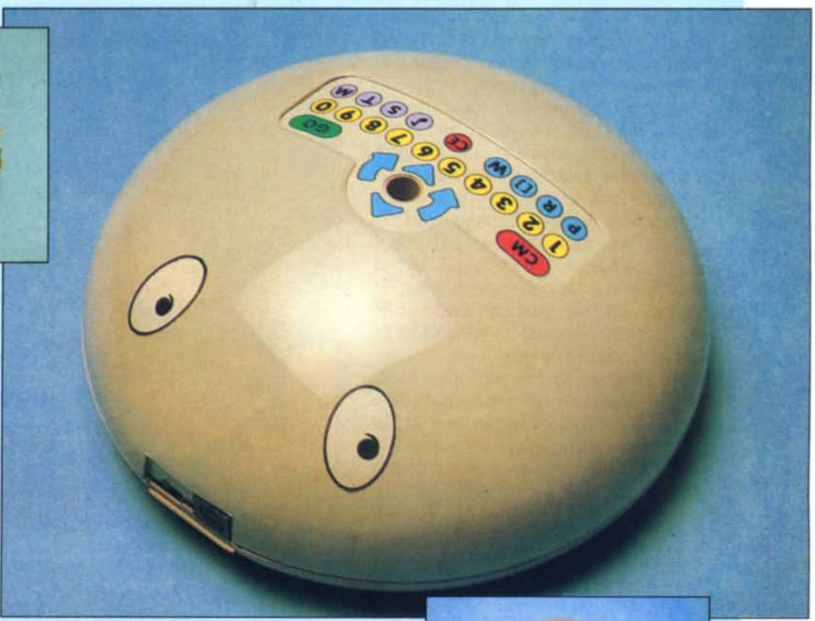
Archimedes software except where indicated. All prices are inclusive of VAT.

MINERVA

69A SIDWELL STREET, EXETER, EX4 6PH. TEL. (0392)437756
FAX. (0392) 421762

The BETTer approach

The BETT show is the place to see the latest hi-tech equipment available for education: Peter Davidson reports on what he found at this year's event



The Valiant Roamer, one of several robotic educational toys on display

THE British Education and Training Technology exhibition is probably one of the biggest events of the year with an educational theme, and the Barbican was packed with teachers and advisors looking for the best tools for their trade.

The exhibition covered four floors and products on display ranged from dice costing a few pence to powerful computer systems, CD roms and other equipment costing thousands. From primary to university level, there was something for everyone with an interest in education.

All the major companies supplying micros to education were represented, but getting around the demonstrations on the Acorn stand was difficult because of the number of people showing an interest in the products.

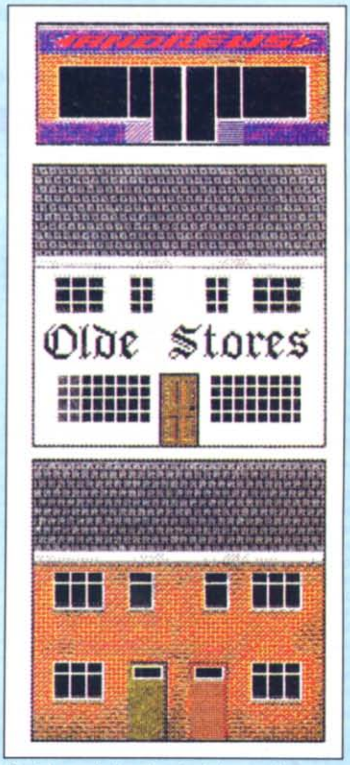
A lot of suppliers provide their software on several micros used in educational establishments ranging from the 8 bit model B to the 32 bit Archimedes series. However, the 8 bit BBC Micro is probably still by far the most common machine used by primary children and as you move towards higher age groups they are being replaced by 16 and 32 bit machines.

However, where a lot of processing power is needed one of the Archimedes range is the only choice – two software suppliers told me that their products would never be converted to other micros because of their relative lack of power.

Art design packages on show included 3D CAD packages. ExpLAN demonstrated the 2D Arcol and the 3D Tabs. The latter is different to the usual 3D packages in that not only does it provide perspective views but it unfolds the design so that, when printed, the student can cut it out and make a real 3D model.

The Concept Keyboard is still probably the most popular input add-on, but software for the touch screen is being released at an increasing rate and several packages with options to be driven from either device

➤



Part of a re-design of a street drawn using Arcol and printed on an Integrex 132 were on display. Various specialised switches and other input devices for disabled people were also shown.

A simple but excellent new idea for input is the Contact Keyboard which sits over the existing keys and uses plungers to press them. Several versions were available such as a small piano-type keyboard and one with six large buttons on a pad.

Music was represented on both the 8 and 32 bit micros. On the former, Hybrid was showing its various systems, including one that works with the touch screen. EMR demonstrated more add-on software for its well-known Studio 24 Plus.

With their number of expansion ports, the BBC Micro and Archimedes computers are ideal for controlling devices. At the show lots of robotic equipment was on display – from construction sets like Control Logo to ready-built turtles.

Both Valiant Technology and Fernleaf claimed to be having trouble keeping up with the high demand for programmable beasts – the Roamer and Pip. Both companies are soon to release new software and leads to allow their products to be programmed from the BBC Micro.

No CD roms are available for the Archimedes series yet, but Acorn was demonstrating the Next Technology one which is soon to be released. Along with the standard floppies and Winchesters, Cumana showed several hi-tech storage devices like CD roms and disc cartridges. It promises several of those on display will be available for Acorn micros soon.

Creators of the Concept Keyboard

Software for the Concept Keyboard is becoming more plentiful

The Ecodisc CD rom from ESM is impressive on the Apple Mac – providing the company can get sponsorship it will be converted for the Archimedes range.

The three big public utility companies, Telecom and the Gas and Electricity boards, were all well represented and displaying both teaching literature and software for schools.

These companies all provide high quality, reasonably priced resources and all schools should make use of the services they offer.

Acorn said it was using the show to reaffirm its position as leading supplier of computers to schools in the UK. It did.

Software and add-ons are still being released for the 8 bit range and more and more is being converted or written for the 32 bit machines.

● *We'll be looking in detail at all the products mentioned in this article and lots of other new releases in future issues of* The Micro User. *Next month's issue will contain several reviews of educational products, a view on how in some schools each micro is used by up to 400 children and a superb game for you to type in and then learn while you play. It goes on sale on February 14.*

BBC ARCHIMEDES Z88

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All items are the official Acorn products (worth over £54)

BBC MASTER

Master 128	£395.60
Turbo Module	£111.85
Eprom Cartridge	£12.80
IEEE Interface	£265.40
2nd Processor	£49.80
Econet Module	£47.40

ARCHIMEDES

310 Base	£832
310 Mono	£992
310 Colour	£1008
310M Base	£895
310M Mono	£955
310M Colour	£1071
410/1 Base	£1090
410/1 Mono	£1150
410/1 Colour	£1166
420/1 Base	£1570
420/1 Mono	£1630
420/1 Colour	£1646
440/1 Base	£2370
440/1 Mono	£2430
440/1 Colour	£2446

A3000	**£640**
Floppy Disk	£104.80
20Mb HD + Controller	£425.30
Econet Module	£42.30
Backplane	£36.87
Rom Expansion Card	£58.30
I/O Expansion Card	£79.40
Midi Expansion Card	£66.22
Midi Add-on to I/O	£37.40

CAMBRIDGE Z88

Z88 Computer	£195
Mains Adaptor	£8.67
128K Ram Pack	£42.35
128K Eprom Pack	£42.35
32K Ram Pack	£17.34
32K Eprom Pack	£17.34
Eprom Eraser	£33.68
PC Link II	£30.39
Parallel Cable	£22.82
Serial Cable	£8.67
BBC Link	£20.63
512K Ram Pack	£162.68
Carrying Case	£8.67

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CO-PROCESSORS PAPER

JIGSAW

from 4MATION for the Archimedes

with screens by Rodney Matthews

✿ JIGSAW ✿

turns any screen or sprite into a 12, 20, 32, 48 80 or 120 piece jigsaw puzzle.

£29.00 + VAT (inc P&P)
Price includes site licence. Use Jigsaw on all your machines.

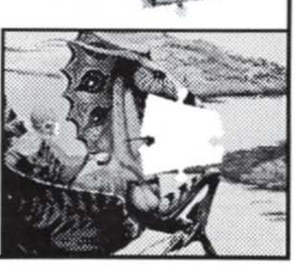
✿ JIGSAW ✿

comes complete with 15 superb screens by Rodney Matthews and Dave Cowell.

✿ JIGSAW ✿

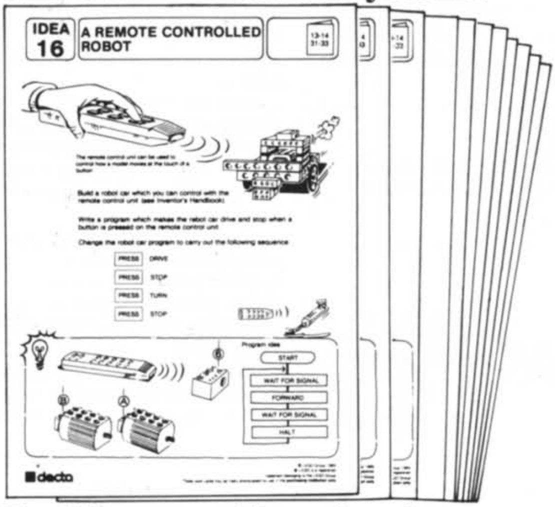
with 24 levels of difficulty, is suitable for all ages.

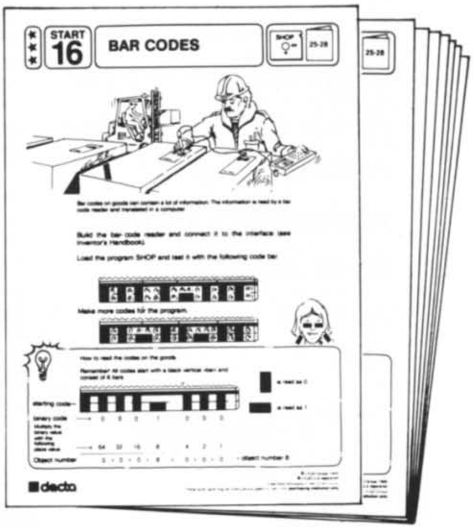
4MATION
Educational Resources
Linden Lea, Rock Park,
Barnstaple, Devon.
EX32 9AQ
Tel. 0271 45566
Email 01:YNK045



Introducing Information Technology

New set of resource materials for introducing measurement, control and communication systems.

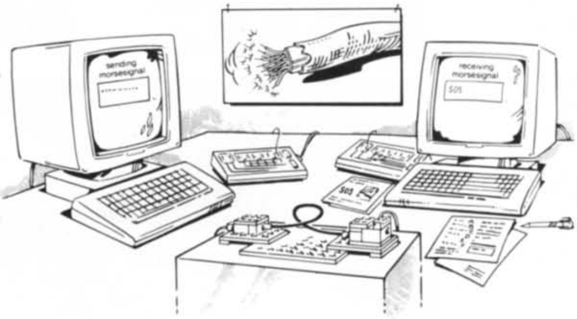

IDEA 16
A REMOTE CONTROLLED ROBOT
13-14 31-33
START
WAIT FOR SIGNAL
FORWARD
WAIT FOR SIGNAL
HALT
dacta


START 16
BAR CODES
SHOP
25-28
dacta

The resourse materials include 20 START, 30 IDEA cards, an Inventor's Handbook, a Teachers Guide and software. The activity cards progress from simple to more advanced design briefs.

Exciting new ideas for classroom application.

The Ideas for Communication and Control Resource Pack involves students in designing and controlling x - y plotters, reading bar codes, communication via fibre-optic cables, data collection, data handling as well as measuring speed and acceleration.
The resource materials include workcards, software and a teacher's guide.
The resource pack is available for BBC and RM Nimbus computers.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To: LEGO Dacta, LEGO UK Ltd,
Wrexham, Clwyd LL13 7TQ.

MU/1

The materials can be used for activites such as transmitting morse code from one computer to another by using LEGO® light bricks, sensors and optic fibre cables.

LEGO dacta

LEGO Dacta is the educational division of the LEGO group specialising in learning materials for pre-schools and school.

LEGO Dacta products are available only from specialised educational equipment suppliers.

®The LEGO Logo is a registered trademark. ©1990 LEGO Group Offer applies to UK and Republic of Ireland only.

Back to the Armada

An educational program developed by teachers whose expertise covers the fields of history and information technology should have something special to offer. Rog Frost takes an in depth look

ARMADA is a comprehensive project package for secondary aged pupils. Produced in Northern Ireland, it is suitable for use anywhere in the UK or Eire. Opening the box reveals a veritable Aladdin's Cave of materials – a plethora of discs, information books, worksheets, slides and posters along with a small but handy teachers' book.

The whole ethos of the pack centres around skills-based history. The development team are all – bar one – practising teachers. All are convinced that a standard, chronological approach to the Armada did not give pupils opportunities for analysis and interpretation.

Product: Armada
Price: £89.25
Supplier: Computeach, A203, Portview Trade Centre, 310 Newtownards Road, Belfast BT4 1HE.
Tel: 0232 732785

They are equally convinced that data files should only form a part of the project and that traditional resources should be included in the package. It was also felt that it would be inappropriate for all pupils to attempt to cover everything, so one of the aims of the package is to encourage the sharing of skills and knowledge.

On one of the discs is ITV's KEY database. It's easy to use and very thorough in what it does, allowing access to large amounts of disc-based data along with graphics.

Most secondary schools will surely already have a copy together with some data files – they are supplied very cheaply by ITV – but even if they don't it will take a very short time for pupils to become familiar with the menu style.

All of the options, including graphic presentations like bar graphs, pie charts, scattergrams and Venn diagrams, are easy to obtain. Printouts are produced with a single key press but I feel the Epson screen dump leaves a little to be desired. The screen colour choice might be ideal, but the printouts tend to be rather confused.

If you have Quest, and not KEY, the

Ireland and the Armada wrecks
Sept. - Oct. 1588
ULSTER
CONNACHT
LEINSTER
MUNSTER
Spanish Ships
English Ships Information and WorkSheets
Armada Guns Information Sheets Examples
Armada Guns
El Gran Grifon
La Trinidad Valencera
Armada Guns
Spanish Fleet
English Fleet
Firing a Cannon
Database Armada
Teachers' Booklet
Information Technology for History

data files are provided in a suitable format for that as well. This is not so easy to use, as it requires the use of a command language, which seems very dated these days.

Some 320+ ships are recorded on the database and include all of the Spanish and English ones involved in the Armada process. Each has 13 pieces of information stored about it and while most fields are short, the information field is lengthy. A typical entry for this field might read:

"William Borough's ship. Built in 1585: Was no use as a warship and took no part in the fighting. A royal ship."

Other fields give details of the number of seamen and soldiers carried, the displacement of the ship, its name and which squadron it was in. If it was lost you can find out where it foundered and on what date. It is a comprehensive set of data, and from it you could find, for example, that although 60 Spanish ships were lost, only one of them was as a direct result of English gunfire. Or, that the six English ships which were lost were all *fired* at Calais.

The guns' database contains further details of the 88 vessels – some from each side – which carried gunnery equipment. This gives extensive information on the numbers and types of ordnance carried. Here you could immerse yourself in sakers and demi-culverins and also discover who was the officer aboard each boat and whether it remained safe. For example, it is possible to discover that 10 of the ships weighed more than 750 tons and three of these were lost. The work books which accompany the databases are superb. Each contains instructions for operating KEY using examples based on the data on the disc. Then come sets of photo-copiable – within the institution – masters which are bold and clear and very easy to use. Each sheet has an attractive heading and does not carry too much written material on the page.

Tint hint

The language level is technical – it has to be – but still at a level suited to the early years of secondary education. There is a standard format to the worksheets and pupils will know that text within a grey box was first written or spoken at the time of the Armada.

As might be expected, the earlier sheets deal with simple searches and ask pupils for factual responses. As pupils work through the worksheets the questions become more searching and require analysis and understanding of the issues involved.

The worksheets and data files are well supported by the reading books. Data on its own is very useful, but can't give a *feel* for life in 1588. The extremely limited diet for example is not on a data file but can be accessed from the readers. This basic information on how to feed an army, let alone have it fit for fighting, could be a fascinating subject in its own right.

There are four main books: The Armada at Sea, Guns and Gunnery, The Armada in Ireland and Archaeology – Life on Board. These maintain the very high standard of the other material and are well worth a read even if isolated from the rest of the package.

Other supporting materials include sets of slides on the treasures of the armada from Dublin Museum and on the different styles of on-board gun – some are taken underwater at wreck sites. There are also a number of full colour posters, each with an accompanying sheet of information to explain just what the scene portrays.

Moving away from the KEY or Quest database files, pupils can access information about the wreck sites around the North and West coasts of Ireland. This involves using a specially written program which features a map of Ireland, divided into its four ancient areas of Munster, Leinster, Connacht and Ulster.

As more than 20 ships were lost around the windswept Atlantic coasts of Ireland, it is a significant area in the story of the Armada, and of importance to pupils anywhere.

The wreck sites program is very easy to use, and most pupils will feel at home with it and will be able to sort out the data in any of the available forms.

Wrecks may be located by the name of the ship or the squadron it belonged to. The different counties can be examined to see which ships foundered on their coast line, and particularly interesting is to find the wrecks by date. It is possible to follow the progress of this unfortunate and ill-starred fleet as it tried to make its way to safety.

Also fascinating is to check on the fates of boats of different sizes, and final options allow users to check on wrecks where the identity of the ship is certain, uncertain or not known at all.

As with the KEY files, there is more than adequate support material in the form of a book. This starts with guidance to steer the uncertain through the mechanics of the program. This can be skipped by most youngsters who could move straight on to accessing information using the tidy worksheets and pages of information within the book.

One weakness of this program is that,

➤

Armada
The Armada at Sea
Firing a Cannon
This is to Certify
Armada
Guns and Gunnery
Armada
The Armada in Ireland
Armada
Archaeology: Life on Board
Ireland and the Armada wrecks
Treasures From The Spanish Armada
Ulster Museum
Armada Guns WorkSheet
4
Set of worksheets to accompany KEY + Armada Guns database

What you get in the Armada pack

- The ITV KEY database program
- A data disc containing files on the English and Spanish ships involved in the Armada.
- A disc containing the KEY program, plus a file on Armada guns.
- A disc containing a modified KEY program, plus a file on English ships.
- A disc containing modified KEY, plus the Spanish ships' file.
- A disc containing the three data files in Quest format. The Quest program is not supplied.
- A separate database on Irish wreck sites.
- A simulation based on firing a gun on a ship.

➤
as far as I can see, it lacks the ability to produce printouts. No doubt the publishers will excuse that since virtually all of the photo-copiable sheets contain printed outline maps of Ireland.

And so, finally, to the program which I found had most immediate appeal to pupils – the simulation of firing a ship's gun. The first thing that most pupils learned was that shooting out a cannon ball was not an easy task. Care was needed, along with the knowledge that could only come from reading the manual. Indeed, the first warning that the software gives is that mistakes in gunnery usually prove fatal.

First, prospective gunners must sign on. They are allocated to a ship – The Hope – and then they are sent into battle. The first task is to decide which type of gun to fire. There is a choice of seven, some of which are muzzle loaders while others are breach-loading devices.

Having selected the gun, the correct sequence of cleaning it and loading it must be carried out. The right amount of powder must be used, along with the appropriate weight of shot. If you thought that plain round cannon balls were the limit of sixteenth century technology, you are very mistaken.

> “Used as straight IT exercises, the packages performed very well”

Gunners can choose from case shot, a form of shrapnel – if their purpose is to kill crew – or two half balls linked by a chain to wrap around masts and damage rigging. There was even an evil cannon ball known as spring shot which produced knife blades as it left the cannon.

If everything is achieved in correct sequence and with sensible values the scene moves to the gun deck. The fuse burns and a ball is fired towards a Spanish galleon.It is not possible to see whether a hit is scored or the extent of the damage. An action replay occurs as seen from the enhanced view point of the lookout. Now, with luck, the ball is seen hitting the target and causing damage.

Another booklet of information and record sheets accompanies this program: It is up to the usual high standard explaining, in full, details of the different guns and the required methods of firing.

There is also a set of cards, showing the stages in firing a gun, which could be used for sequencing away from the micro. There are also two certificates which can be awarded to successful gunners – one gives credit for being adept with one gun, while the second is for those devoted gunners who score with every type. This can, apparently, be achieved in about 10 minutes of micro time.

My teaching is involved with information technology rather than history, and I have used the packages as straight IT exercises. As such they have performed very well, with pupils realising the many advantages of a database but also the limitations.

The Armada database could better be integrated into a lower school history program where it would have a more direct relevance.

Summing up

The whole pack has been put together in a most professional manner and this package thoroughly deserves an active place in secondary schools.

The economical and practical design of the City Desk Workstation removes the systems hardware from the desk surface providing optimum use of available space. Its many design features are suited to home or office use.

At £139.50* it pays to put technology in its place

Compatible with the majority of PC Systems currently available its many assets include a steel cantilever frame – full cable management – heavy duty lockable castors – heat/stain/scratch resistant working surfaces available in either cream or grey – a full depth drawer unit which can be assembled for left or right hand use and with overall dimensions of H35" W47" D29" it can negotiate a standard 30" doorway with ease.

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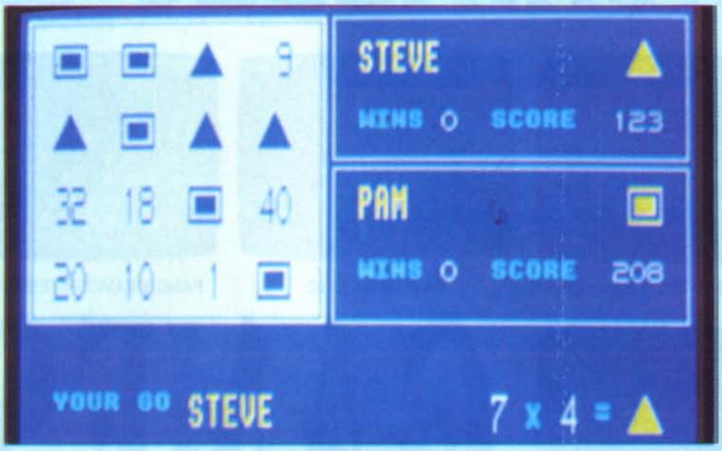
Postcode________ Tel No: ________
MU3

A strategic game from Martin Sann which proves that multiplication tables need no longer be a bore



Stratagem

PRACTISING times tables is usually a boring task avoided whenever possible by all children. But now it can be fun. Here's a challenging two-player game based on tables but still retaining the children's interest.

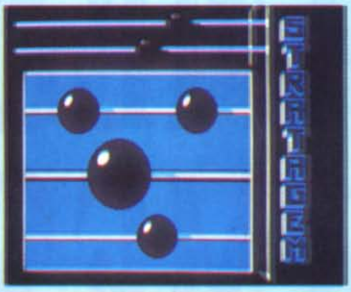
The aim is to score as many points as possible by removing the different numbers on a four by four grid. You score the value of the number you eliminate plus an optional time bonus.

You can choose from two levels of play – easy where the highest number possible is 32, or hard with a maximum of 81. There are also two bonus options so you can collect additional points based on on a time basis or a line basis or both.

Each number on the grid is the product of two integers. The first player has to use the Z and C keys to cycle the two numbers displayed in the problem until the answer would match one of them. After that, you and your opponent take turns to alter just one of the integers by using either the Z or C key – the first one you use becomes the operative key for your turn.

Press Return when you think you have a product match. Watch out if it doesn't eliminate a number, because you'll give 25 points away and allow your opponent to use both keys on the next turn. The last of the 16 numbers to be eliminated is given to the next player to save both of you from tedious endplay which can – and usually does – go nowhere.

If you choose a time bonus, the faster you play the bigger your score. Also, if you're quick your opponent will have less time to collect bonus points on the next go.



But be careful – if you get an answer wrong, more time is given to the next player.

The line bonus means that if your opponent has three symbols in any horizontal or vertical line – not necessarily joined – you get 50 points. If they are unlucky or inept enough to allow four of their symbols to occupy a row you get a tasty 200 point bonus. The line bonuses are allocated when all 16 numbers have been eliminated.

There is a fair measure of strategy involved, especially at the start of the game. The restriction on the products that you can make means that you should keep an eye out for the good position and not be too hasty in gaining initial high points. This is especially true if you've opted for the line bonus.Type in the two parts of the game and save them as STRAT1 and STRAT2. Check that you have entered them exactly as printed using Get it Right! To run the program enter CHAIN"STRAT1"

The first program, which is in Mode 7, saves your name and that of your opponent in memory at &380 and &38A. It also redefines some characters, including the numbers 0 – 9 (for good cosmetics) and sets up a symbol for each of player (a triangle and a square). STRAT2 is then chained and runs in Mode 4.

So aim for a high score and answer as quickly as you can. But be careful not to get three on a row.

This is certainly a game for thinkers, so enjoy yourself and you'll soon find you know your tables far better than you ever did before.

Turn to Page 107 ➤

PROCEDURES

choose	Gets level and bonus choices
read	Reads data for 36 products
scram	Prints 16 random products
change	Main loop
keys	Checks for key presses
check	Checks for product match
ok	Updates score
end	Checks for three or four in a row and gives bonuses

VARIABLES

p1$,p2$	Names of players
game%	Which bonus is operative
prod%	The 36 possible products
f%	first alterable digit
s%	second alterable digit
ans%	*f% * s%*
tot%	Value of product matched with *ans%*
sc1%,sc2%	Players' scores

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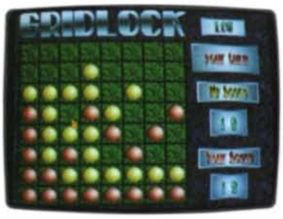

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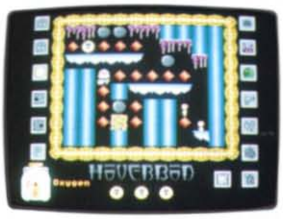
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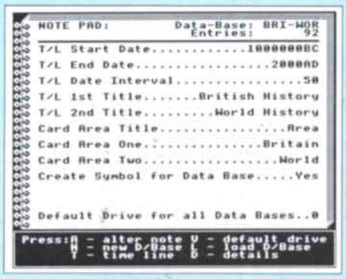
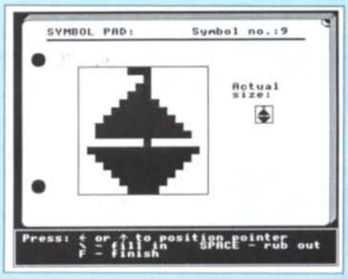


```
NOTE PAD:                Data-Base: BRI-WOR
                           Entries:      92
T/L Start Date............1000000BC
T/L End Date.................2000AD
T/L Date Interval...............50
T/L 1st Title.......British History
T/L 2nd Title.........World History
Card Area Title...............Area
Card Area One..............Britain
Card Area Two................World
Create Symbol for Data Base.....Yes

Default Drive for all Data Bases..0
Press:A - alter note V - default drive
      N - new D/Base L - load D/Base
      T - time line  D - details
```

The note pad



```
SYMBOL PAD:            Symbol no.:9
                                  Actual
                                  size:
Press: ← or ↑ to position pointer
       \ - fill in      SPACE - rub out
       F - finish
```

Symbol drawing pad

Time for teaching

Rog Frost explores a cross-curricula data management aid to instruction

Product: Time Lines
Price: £25.65 Archimedes £29.67
Supplier: Soft Teach, Sturgess Farmhouse, Longbridge Deverill, Warminster, Wiltshire BA12 7EA.
Tel: 0985 40329

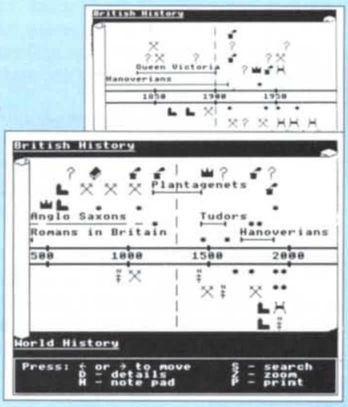
TIME LINES is a data management program with a historical context. The idea is that you set up a database on a particular historical topic which can be stored on a disc as a resource so other people can gain easy access to it.

Each historical record is kept in a card format with dates and title first, followed by the body of text. Three linking references can be set up for each record, and it is possible to create teletext style pictures to accompany some of them. A special symbol is also added to each record, to indicate the nature of the information.

Three types of record are possible: Individual *dates* allow an entry to be made for just one year. A *span* has a precise beginning and end, while an *era* is a bit fuzzy at either end. The heart of the program is the Time Line which runs across the screen and has dates marked on it at intervals which can be set from 10 years upwards.

Above and below the time line the special symbols of records will be shown, along with the spans and eras which have been set up. The *above and below the line* idea is very clever, since the two areas are, in fact, separate databases and this can allow comparisons.

You could set up family history above the line set in the context of general history below the line. Cursor keys are used to scroll through the time line. At any point you can stop and press D to see the details for that year. This will show a record card if one exists . When a record card is on screen the cursor keys allow you to skim through to neighbouring records.



```
Press: ← or → to move      S - search
       D - details         Z - zoom
       N - note pad        P - print
```

Zoom feature in action. Top: 50 year interval. Bottom: 500 year interval

Searches are also possible, from both the time line and from record cards. They can be for dates, specific titles or for the special symbols that give a category for each record. The cross reference system allows for rapid searching for linked records.

There are two aspects of design within the program. Firstly, it is possible to set up your own special symbols to use as labels, generated very easily on a grid system. Teletext graphics can also be created – and linked to particular records – using a more than adequate design program.

The support materials with this package comprise a clearly written manual, plus a number of aids to help with gathering and collating data. These include forms for putting dates and general headings on and ones for preparing Time Lines record cards. There are design sheets for symbol creation and a very useful page for the teletext graphic designing.

Another reference card shows the predesigned symbols and has space for you to add new ones. All are copyright free for use in schools.

Perhaps I can best put a value on Time Lines by describing what happened in my school when I first received an inspection copy – Soft Teach will issue most of their programs on approval. I showed the program to the librarian who had decided within 10 minutes that Time Lines was an essential for the library – particularly for setting up a local history database.

When the head of science came in he had pledged the money to buy the program within five minutes. Apparently it will be of great help with implementing the new national curriculum in science.

The next day the geography people also decided it was essential. It seems they do work on family history and soon after that I was approached by the history department who also felt that Time Lines had a great deal to offer – particularly by being able to relate one aspect of history to another. Eleven and 12-year-old pupils started entering their own family history and found it quite straightforward.All of these people are aware that Time Lines is a little greedy on hardware. While it can be used with a single drive, this involves quite a bit of disc swapping and there is no doubt that two disc drives help a great deal.

The amount of data which can be stored on a disc depends on the format: A 40 track disc can store 160 records and 27 pictures while with an 80 track one the number of records increases to 220. With the ADFS version this figure can be increased to 300 records.

Time Lines is intelligent and will set up the maximum space when you start a new database. The Archimedes version – I'm told it is coming soon – will store 1000+ records, including drawings.

There is one other limitation. The text entry system is not via a word processor. You have to press Return to end each line of text, and mistakes on a line can only be rectified by deleting and starting again. A careful user can soon learn this, and data can be entered quickly.

Summing up

Here's a very versatile, easy to use and useful database for pupils and teachers alike. Unfortunately it's a little greedy on hardware. I would certainly recommend it, not only to junior and secondary schools, but also to individuals or history societies. A first rate package.

Are you sitting comfortably?

When is a micro better than a book? Marshall Anderson investigates...

Product: Reading Corner: Folk Tales
Price: £9.95 (BBC B, Master, Archimedes)
Supplier: BBC Soft, PO Box 234, London SE1 3TH.
Tel: 01-576 2548

THIS package was produced by Innocent Software to go with the popular Reading Corner radio series. It provides, on disc, the text of eight of the stories from the second series. Specifically these are folk tales from around the world, and from that point of view the scheme has much to commend it. As a narrative the stories are exciting and capable of launching a great deal of cross-curricular work.

The software format is straightforward: To begin with you are invited to select a story from the menu and then various display options are presented. This may be read from an selected page, each being between 10 and 20 screens long.

The text has illustrations which may be included and if you plump for this no further text formatting is available – though you can send the text to the printer. Should you select the text-only option, you will be able to cycle the text and background through any combination of seven colours as well as printing in double height.

Once the display format has been chosen the display style is set. At its simplest this just prints picture/text a page at a time – arrow keys take you forward or backward through the text.

Other options cause text to appear by the letter, word, sense group or punctuation. The latter two options are extremely promising as they group words in very much the same way they are read.

The other choices seem less useful as they will naturally limit the use of forward acting cues.

Letter by letter seems extremely tedious, but some situations may call for such an approach – it could make the basis for a Cloze type activity where the next word is guessed. Having set up these options the child now takes over and reads the text.

And this is where it all gets disappointing: I don't understand why Mode 7 is still used as a graphics medium. Its appearance puts you in mind of the Four-Tel children's pages and some of the illustrations are simply unrecognisable.

Other software publishers dealing with the junior age range have developed graphic styles in Modes 1 or 2 which are capable of delightful pictures and animations. There is no reason I can see for still producing work like this.

Having said that, it is the text that is important and many teachers may not use the pictures at all. Being able to control colour is important, especially for children with slight visual problems, and the double height option seems further to help in this area. Unfortunately, using the double height option causes text to scroll quickly off the top of the screen if the page is too full.

While in the picture mode colour is used very creatively with text to point up the use of speech. This is helped further by a spacious style of setting out when lots of characters have something to say. On the other hand, some of the pages, while still split using colour, can seem very crowded.

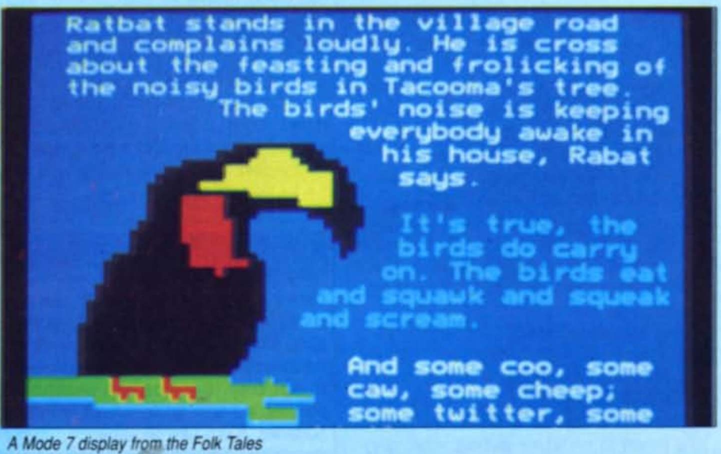
This brings us to a further point of confusion. The manual proclaims: "Its flexibility and versatility make it an essential classroom resource for meeting individual and group needs across a wide age and ability range." You might therefore expect that different reading abilities would be covered, but examination of the text displays some variation – these might just as well be accidental for there is no guide on the screen or in the manual as to which story works at which level.

Much of the language is difficult, and it's not just a question of the words used, the actual sentence construction is often awkward and unfamiliar.

What BBC Soft is offering is eight stories in a teletext format. The price is very reasonable, and if you use the radio series as part of your reading resources you will find some use for this disc.

In the final analysis the question is: What is the micro doing here that a book can't?

Asking my school's Special Needs team resulted in the comments that if a child can read unaided to this level then they do not need help. If they can't they would still need to be accompanied, and the adult/child working with them can control the reading process in a much more creative way than the micro. Perhaps another resource for your reading scheme, but try to see it before you buy.



Ratbat stands in the village road
and complains loudly. He is cross
about the feasting and frolicking of
the noisy birds in Tacooma's tree.
The birds' noise is keeping
everybody awake in
his house, Rabat
says.

It's true, the
birds do carry
on. The birds eat
and squawk and squeak
and scream.

And some coo, some
caw, some cheep;
some twitter, some

A Mode 7 display from the Folk Tales

Summing up

This inexpensive software has a good story content and is a backup to the radio series. But it's unimaginatively presented and lacking in flexibility.

INTER DICTOR

"I HIT THEM AT FULL THROTTLE...

...The target in sight!

...NOW I'VE GOT TO BLAST MY WAY OUT"

It was getting hot, a couple of SAMS *(Surface to air missiles)* had taken out my escort. I'm on my own.

Going in low was my only chance, got to get under the radar cover. I banked right into the valley basin and started to follow the river, the target could only be minutes away.

BANG!!!

Explosion right in front of me, I yanked the stick hard right, I hadn't expected flak this low. I had to take out the *ack ack guns*. Weaving I flipped off the safety clip and squeezed the trigger.

All I could hear was the deafening roar of *30mm cannon fire*, I watched the tracer burn down to the ground and pop the ack ack like crackers. The bridge was getting closer, over or under? Over and radar would pick me up faster than I could say... Fast, Under and, well, I might not make it.

Some choice, I went under and... I made it, straight into a hail of cannonfire from an enemy patrol fighter, I pulled the stick all the way back, he couldn't match my climb, before he knew it I had dropped on his tail and seconds later two of my *air to air missiles* had ripped him apart... Eat that sucker.

They were throwing everything they had at me now, I was on top of them, I went in on full throttle, they didn't know what hit them.

Five full passes, sure, I got bruised, but nothing compared to the carnage on the ground. Spires of smoke, earthshattering explosions. I had pumped everything I had into them, now I had to blast my way out.

Interdictor is the ultimate in realistic flight simulations. Giving you total control of a high performance modern jet fighter.

It runs on all Archimedes computers with at least 1 MB of memory including the A3000 BBC Micro. At your disposal is a breath taking array of graphics, faithful in almost every detail to a genuine combat mission.

Can you capture all the airfields, can you stop the supply trucks whilst utilising your flying skills in the air. It's up to you with *Interdictor*.

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CLARES
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Telephone: 0606 48511 Fax No: 0606 48512

John Clemence puts the pieces together with the aid of a Risc OS program and discovers whether it lives up to its expectations

All cut up

Product: Jigsaw
Price: £29.00
Supplier: 4Mation, Linden Lea, Rock Park, Barnstaple, Devon EX32 9AQ.
Tel: 0271 45566
Requirements: 1Mb Archimedes or A3000

MANY teachers will remember when they first saw Granny's Garden from 4Mation. For most it was a revelation to find a program that could be used in their classrooms which did more than provide skill and drill experiences. Jigsaw is from the next generation.

Turning sprites and screens into jigsaw puzzles, you complete the puzzle by manipulating the pieces using a mouse. The pictures can come from many sources – Paint, Artisan, or indeed any program which allows you to save sprites or screens.

Jigsaw is the first 4Mation program I have seen for the Archimedes, and I wasn't disappointed. There is a tendency among programmers to seize upon the potential of a new and more powerful machine to give you a baffling array of options and possibilities. It can take many hours to discover how to control their results.

This can be justified, but there is a distinction between handing on the power to the user and using the power to present a smooth-flowing easy to use package.

For the most part Jigsaw takes the latter approach. There are very few commands and you are aware that the micro is being used only to solve a problem, in this case how to present an alternative to a real jigsaw without losing its purpose and charm and without turning it into a glorified and complicated game.

The advantage of using the micro to create jigsaw puzzles is that there is an almost limitless variety of possible pictures, including personalised examples from digitising packages. Furthermore, the pieces don't get lost.

It also provides children with opportunities for hand and eye coordination, shape and colour matching and a stimulus for developing increased concentration.

Once Jigsaw is loaded its icon appears on the application bar at the bottom of the screen. Simply drag the screen or sprite icon you want over the Jigsaw icon and they will be created into jigsaws.

Any of your own screens or sprites can be saved in this format once they are loaded into Jigsaw. A number of excellent examples are included in the package courtesy of Rodney Matthews and Dave Cowell.

When you have decided on the picture you wish to use you select one of the 24 levels for your jigsaw ranging through a wide range of possibilities – different numbers of pieces, rotations and so on.

The program is accompanied by a slim manual which explains its use clearly. A nice touch here was to discover that the text pages were printed on environmentally-less-hostile chlorine-free paper.

I have a couple of niggles though. There is a little annoying flicker when moving your pieces around, and I found using the usual menu button – central one on the mouse – as Select was a little disconcerting for some children. Also do remember to save a partially finished puzzle on a disc which contains the Jigsaw application.

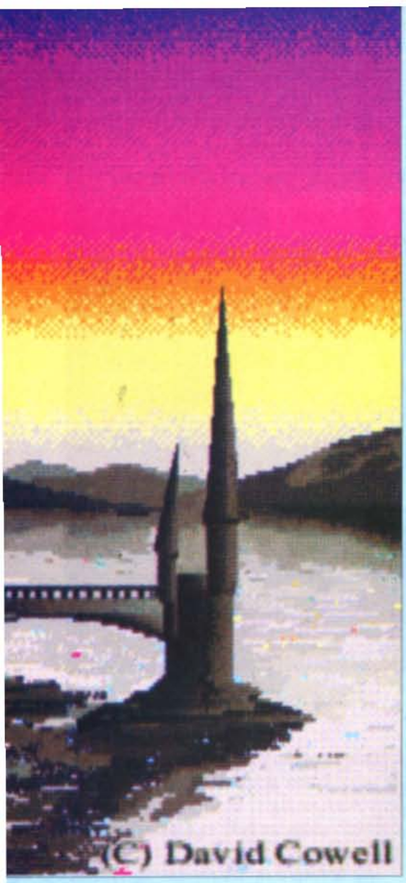
Even so, of all the software we have used Jigsaw is the first which attracted my mother to the machine. She's always fought against micros, but having her love of jigsaws hindered by her arthritis, this program enticed her to the screen. I would make it a must on any shopping list.

Summing up

A Risc OS program which is simple to use and fun, although the non-standard use of buttons is annoying. However you do need to understand your Archimedes and the Risc ideology or you may run into problems. If in any doubt read the manual.

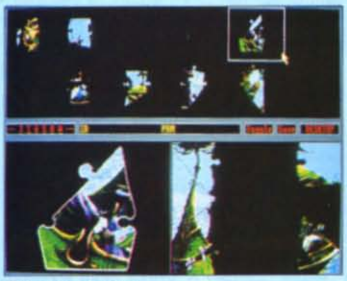
It's green for go

Ian Dickinson evaluates two programs, Snapshot and Leisure Complex, designed to augment environment studies in primary schools



An Integrex dump of one of the supplied pictures

Choosing a piece



Previewing a piece

Putting a piece in place

Product: Snapshot
Price: £17.50
Product: Leisure Complex
Price: £25.00
Supplier: Scetlander, 74 Victoria Crescent Road, Glasgow G12 9JN.
Tel: 041-357 1659

SCETLANDER has built up a healthy reputation for producing good quality educational software and its latest two offerings, Snapshot and Leisure Complex, maintain its usual high standards.

Snapshot is aimed mainly at environmental studies in the middle to upper primary age range. The software works on any 8 bit BBC Micro with a 5.25in 40 track disc drive. Objectives are many and varied and the documentation lists the following, but even these can be easily expanded by the imagination of the teacher:

- Reading for information.
- Reading map information.
- Finding animals in their likely habitat by interpreting symbols and text.
- Cultivating an awareness of wildlife by compiling, from various sources, further information on animals.
- Creating an awareness of the country code.

Up to six groups' information can be saved to the disc at a time and the program is designed to encourage children to work in small teams. After entering the group number, you are presented with a few screens of country code hints followed by a colourful screen map.

From this point onwards, the objective is for pupils to find as many animals as they can by taking a collection of "photographs" of the them in their habitats.

The groups are also given clues to the types of habitats in the Daily Record – a glossy newspaper supplied with the package. It also contains a colourful map relating to the screen map the groups will use. The documentation states that the children should be encouraged to create an information folder on the 13 different types of animals which will be presented.

The program is very straightforward, assuming that you will understand and be able to use the principles of North, South, East and West – the keys that direct you around the map. You will also need to have at least a basic knowledge of map symbols.

A very useful feature is that the teacher can have a look at how each group is doing at any point simply by pressing Control+T.

A table of group numbers is then displayed giving details of the snapshots that each group has made.

Taking snapshots is simple: Just press P and the photograph is taken – a running count of the number taken is given at the foot of the screen and if a printer is attached the photograph will also be printed.

Once into the program you move around the map to where you think the animals might be, but they must interpret the newspaper articles correctly.

All of the key information is contained in the user manual which is meant to be used by the teacher and not the children. Having said that, it is simply and effectively laid out.

The appendix contains information that can be photocopied and distributed to the groups.

Leisure Complex

Following on from this program, Scetlander produced Leisure Complex, a package with a similar feel to that of Snapshot, and indeed, it would be beneficial if children had used Snapshot previously, although this is not essential.

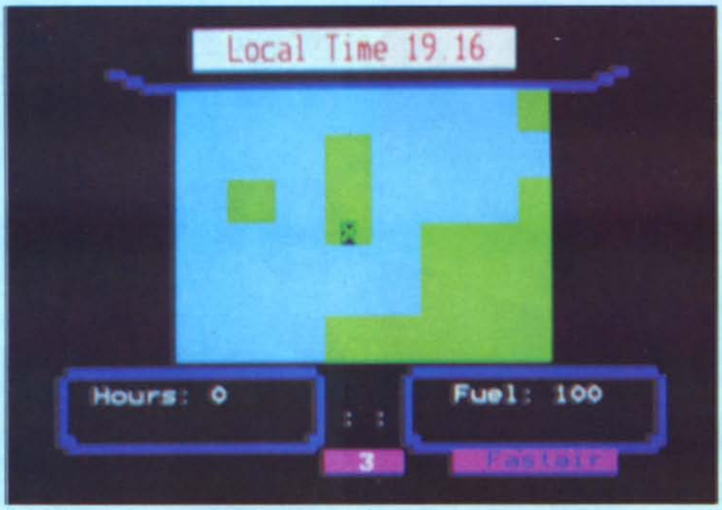
The software is targeted at the middle to upper primary age range in environmental studies. The overall aim is to develop a leisure park. This is achieved by:

- Making a contribution to environmental studies by investigating environmental aspects of the curriculum, such as location,

➤

Out of the blue

The day by day running of an air freight company encapsulates a wide range of skills and at the same time offers children an interesting challenge. Here Rog Frost takes the controls of such a micro simulation



Take off from Heathrow

Product: Sky Routes
Price: £17.50
Supplier: Soft Teach, Sturgess Farmhouse, Longbridge Deverill, Warminster, Wiltshire BA12 7EA.
Tel: 0985 49329

THE basic idea of Sky Routes is very simple. Children, on their own or, more usefully, in groups, have to fly a Boeing 747 to various airports to collect cargoes and deliver them to other places. But for this simple concept comes a good educational package for 9 to 14-year-olds.

Up to 10 different groups can be assigned air freight companies. First sessions at the micro will probably cause problems, even though the groups will be working at level one. It is all to easy to forget to fuel up the aircraft, and it will be quite difficult for younger pupils to plan what route they should take.

Resourceful teachers will already be realising that the program has possibilities for work in the areas of science, geography, mathematics, business awareness and technology as well as creative art and language work.

The software is initially set up to give pupils only 10 minutes so it's imperative to plan strategies before using this valuable time. It is also essential to spend a while after the session analysing what went wrong.

Sooner or later, and it may need more than one session, a group will complete assignment one – collect four cargoes from airports in Europe or North Africa and delivered them safely to their destination.

They then start on level two, where problems can occur. Not all airports will have fuel for them to buy, or it might be at an exorbitant price. A group can buy the right to sell fuel at an airport so that they can earn money from the rival companies, but these will probably do the same to you.

If funds permit, a larger version of the aircraft can be bought to increase the

➤

➤

change, community and comparison/contrast.

- ● Provide children with the opportunity to extend their knowledge and understanding of their environment.
- ● Encourage experiences which contribute to interpretive skills through discussion, investigation, and interpretation of data.
- ● Enable children to gain an understanding of how an environment is a shared responsibility.
- ● Provide activities which are of a multi-disciplinary nature.

On booting the program you are again presented with the Scetlander title screen. From here Control+T takes you into the teacher's section, or pressing the spacebar enters the main program.

The children again work in groups and have to form a development company and plan a leisure complex causing the least amount of damage to the environment while maximising land use.

As the group journeys through the program it is possible for them to consult and print out a record of their development plans, a very useful feature which stimulates discussion and decision making.

The children move around the development area simply by using the cursor keys. Pressing M displays a menu that allows you to choose a variety of facilities to place in the leisure complex grounds.

At the end of the session, group data is saved to the disc for later use and each group can present its designs and evaluate the best possible approaches.

Summing up

Both programs performed extremely well. Leisure Complex is slightly more sophisticated than Snapshot, but is easily mastered. The software is very well put together. You get the feeling that the program writers have the end-users in mind.

The documentation in both cases lives up to Scetlander's reputation for quality and not quantity. All relevant information is held in the A4 sized wallet and the necessary charts and flow diagrams are well presented and accessable.

These packages will be an excellent addition to your software library and will get much use – definitely money well spent.

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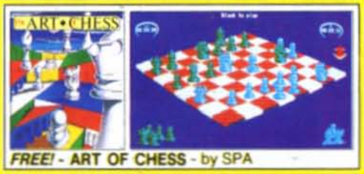
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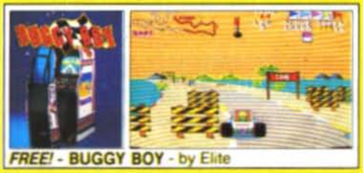
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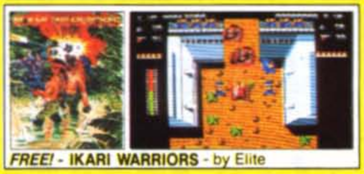
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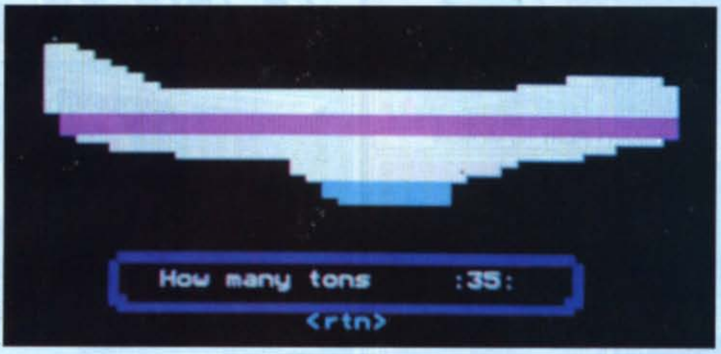
If so, which one do you own?



```
How many tons      :35:
          <rtn>
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Checking the cargo

➤ cargo capacity from 60 up to 100 tonnes.

Level three onwards introduces longer and more demanding missions. Airports in North America, South Africa and eventually all over the world become available for cargo distribution, with more and more problems added. For example, some airports are shut at night, or special landing permits need to be obtained.

From level five, an estimated time of arrival is required and, if accurate, extra money is earned from the trip.

In early levels, when one set of air crew are tired a new one appears, but from level seven it is essential to station crews around the world at suitable places. Higher levels also introduce the need for plane maintenance.

If a group gets really stuck with no fuel or no crew they can appeal to another group to rescue them. It is worth reminding all groups that they might be the one to suffer a major problem next.

The program features plan views of the world as the plane flies. These are rather crude, but attempts are made to show major features – land, sea, deserts and forest – with (on the Master) colouring used to indicate day or night as well.

On screen messages are clear, but there are a lot of possible options and the photo-copiable maps and log sheets will certainly be an aid to groups using the program. Teachers will find the hand book invaluable: It is clear, concise and packed with information.

As might be expected, teachers can change just about every option. The time limit can be altered so engendering a sense of urgency that leads to purposeful work. The value of all of the items that earn or cost money can be changed, although the program producers have already got these well balanced.

Teachers can also carry out the routine disc options such as removing individual groups or all groups. Group files can be backed up to ensure that data is not lost. A very useful option is the printout which enables records to be kept clearly and simply. Also helpful is the ability to change the names of the items which are carried. This could make Sky Routes a handy adjunct to many different projects.

Summing up

As usual with Soft Teach products, ideas for classroom activities are given along with suggestions for assessment. I can recommend Sky Routes as a stimulating piece of software, particularly for the upper end of the suggested age range.

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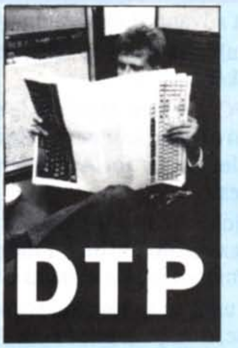
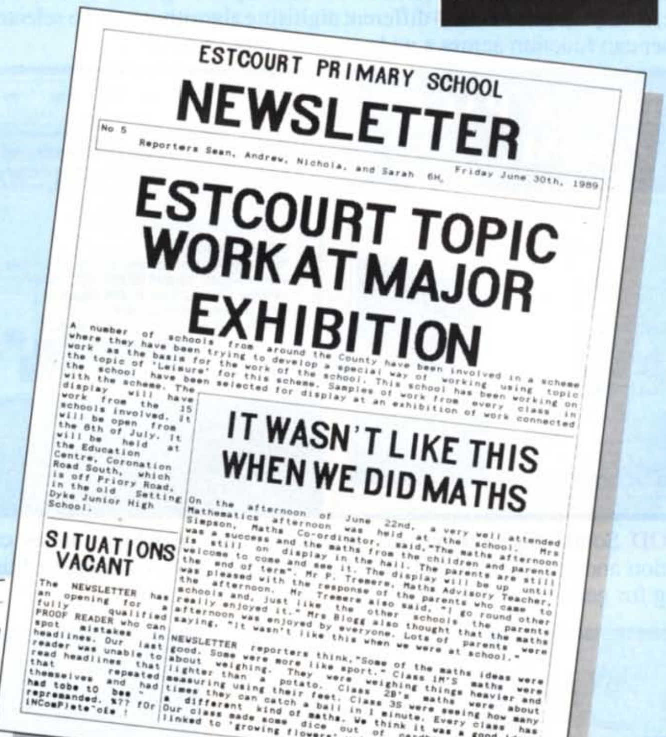


DTP

THE IT Coordinator of Estcourt Primary School, Hull, Gerard Hailwood, has sent this copy of their monthly newsletter to DTP Surgery. It is produced on Typesetter from Sherston Software by 10-year-old pupils working to deadlines, with editing by the teachers. Copies are distributed free to parents, school governers and local industries.

Printing is achieved using a Citizen 120D to cut a Roneo stencil and very clear images are produced as can be seen. Illustrations are rarely used because they are a problem – thermal stencils need to be made and then spliced into the micro-generated one.

If you would like a page from your school newspaper – together with hints from the professionals – to be printed in the *The Micro User* send a copy to DTP Surgery, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.



ESTCOURT PRIMARY SCHOOL

NEWSLETTER

No 5

Reporters Sean, Andrew, Nichola, and Sarah 6H. Friday June 30th, 1989

ESTCOURT TOPIC WORKATMAJOR EXHIBITION

A number of schools from around the County have been involved in a scheme where they have been trying to develop a special way of working using topic work as the basis for the work of the school. This school has been working on the topic of 'Leisure' for this scheme. Samples of work from every class in the school have been selected for display at an exhibition of work connected with the scheme. The display will have work from the 15 schools involved. It will be open from the 8th of July. It will be held at the Education Centre, Coronation Road South, which is off Priory Road, in the old Setting Dyke Junior High School.

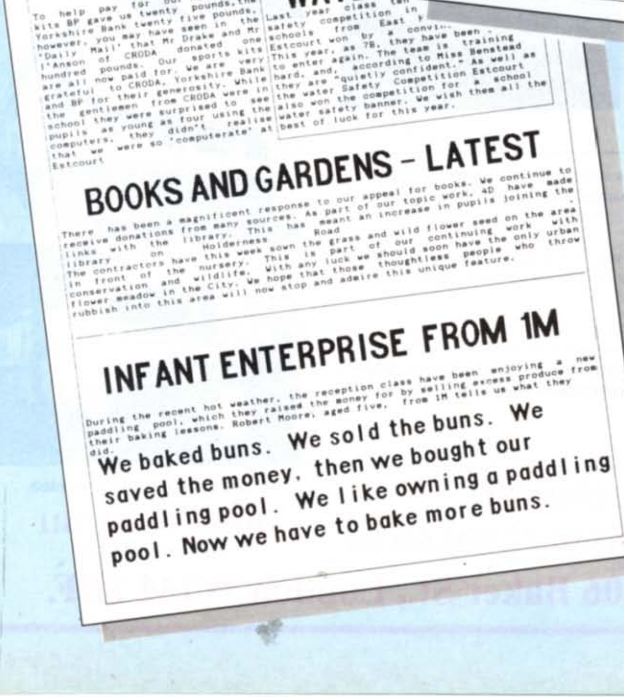
SITUATIONS VACANT

The NEWSLETTER has an opening for a fully qualified PROOF READER who can spot mistakes in headlines. Our last reader was unable to read headlines that that repeated themselves and had had tobe tO bee ~ repremanded. %?? fOr INComPlete~cEe !

IT WASN'T LIKE THIS WHEN WE DID MATHS

On the afternoon of June 22nd, a very well attended Mathematics afternoon was held at the school. Mrs Simpson, Maths Co-ordinator, said,"The maths afternoon was a success and the maths from the children and parents is still on display in the hall. The parents are still welcome to come and see it. The display will be up until the end of term". Mr P. Tremere, Maths Advisory Teacher, was pleased with the response of the parents who came to the afternoon. Mr Tremere also said, "I go round other schools and, just like the other schools the parents really enjoyed it." Mrs Blogg also thought that the maths afternoon was enjoyed by everyone. Lots of parents were saying, "It wasn't like this when we were at school."

NEWSLETTER reporters think,"Some of the maths ideas were good. Some were more like sport." Class 1M'S maths were about weighing. They were weighing things heavier and lighter than a potato. Class 2B's maths were about measuring using their feet. Class 3S were seeing how many times they can catch a ball in 1 minute. Every class has a different kind of maths. We think it was a good idea. Our class made some dice out of cardboard which was linked to 'growing flowers' using dice.



Generous donation ma

local industries

To help pay for our new sports kits BP gave us twenty pounds, the Yorkshire Bank twenty five pounds, however, you may have seen in the 'Daily Mail' that Mr Drake and Mr I'Anson of CRODA donated one hundred pounds. Our sports kits are all now paid for. We are very grateful to CRODA, Yorkshire Bank and BP for their generosity. While the gentlemen from CRODA were in school they were surprised to see pupils as young as four using the computers, they didn't realise that we were so 'computerate' at Estcourt

WATER S

Last year class ten
safety competition in
schools from East Y
Estcourt won by a convi
This year, as 7B, they have been
to enter again. The team is training
hard, and, according to Miss Benstead
they are "quietly confident." As well as
the water Safety Competition Estcourt
also won the competition for a school
water safety banner. We wish them all the
best of luck for this year.

BOOKS AND GARDENS - LATEST

There has been a magnificent response to our appeal for books. We continue to receive donations from many sources. As part of our topic work, 4D have made links with the library. This has meant an increase in pupils joining the library on Holderness Road.

The contractors have this week sown the grass and wild flower seed on the area in front of the nursery. This is part of our continuing work with conservation and wildlife. With any luck we should soon have the only urban flower meadow in the City. We hope that those thoughtless people who throw rubbish into this area will now stop and admire this unique feature.

INFANT ENTERPRISE FROM 1M

During the recent hot weather, the reception class have been enjoying a new paddling pool, which they raised the money for by selling excess produce from their baking lessons. Robert Moore, aged five, from 1M tells us what they did.

We baked buns. We sold the buns. We saved the money, then we bought our paddling pool. We like owning a paddling pool. Now we have to bake more buns.

Comments

The Micro User design team was quite impressed by this newsletter, coming as it does from 10 year olds, but two points should be made regarding the layout and type used.

Capital letters are used almost exclusively for the headlines, and while they give an "important " look to a story, they are generally considered to be more difficult to read than lower case letters.

Also the use on very wide columns of text makes it difficult to read in parts.

On the plus side, the Estcourt Primary team has avoided the common trap of using too many different type faces – a practice which often results in a very "bitty" product. Keep up the good work, Estcourt.

MULTIPOD PROFESSIONAL

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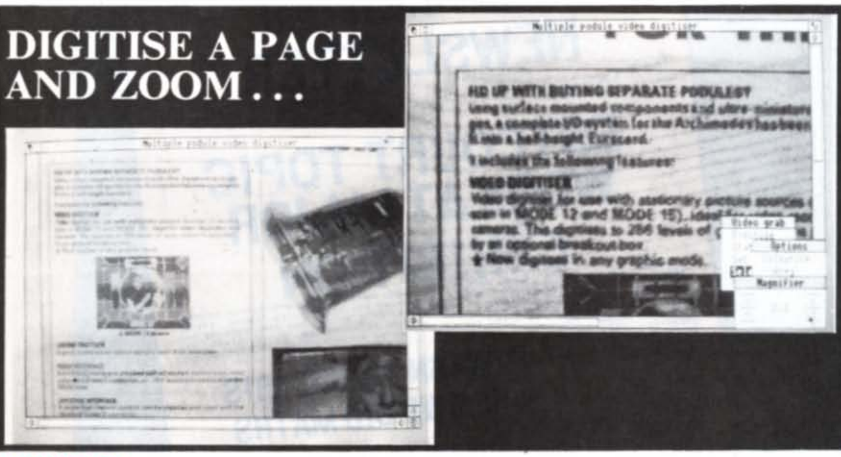
MULTIPOD Video digitiser is simply the best video digtiser available for the Archimedes, having 2-3 times the resolution of hand scanners. The digitiser now supports NPQ (near photographic quality) pictures of 640*576 with 256 dithered levels. Or for Artists the powerful but totally unique contrast control for changing the moods/atmospheres of pictures.

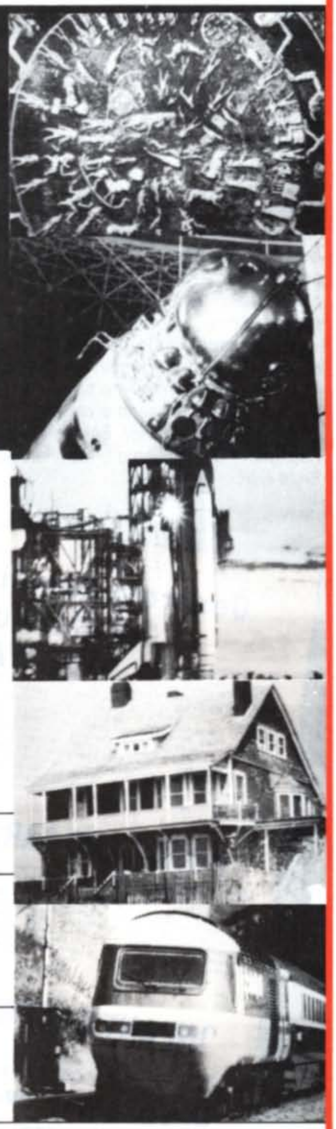
Colour pictures using the most advanced colour reproduction algorithms on the Archimedes, use 24 bit colour dithering with a max resolution on a 1 meg machine of 640*256. Although 640*576 resolution pictures can be obtained. Using a colour/monochrome camera with filters.

It can be used as a powerful scanner for DTP work operating from a video recorder with still frame, or any video camera. 4 different digitising algorithms can be selected to ensure the digitiser can function across a wide range of input sources.

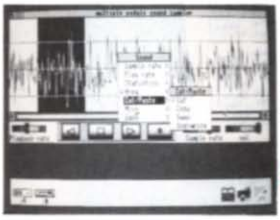
Images below are 640*512 multi-scan

DIGITISE A PAGE AND ZOOM . . .





MULTIPOD Sound digitiser has an advanced interface which makes capture, manipulation and playback of real sound surprisingly easy. Complete editing and processing for good sounding results.



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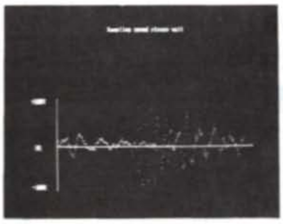
Feb Micro User and
Feb A&B Computing



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PROBLEM Solved

Your technical questions answered by MIKE COOK

Modifying monitors

FROM past issues of *The Micro User* I note you have suggested modifications for digital input monitors for use with the Archimedes 310 analogue input. Is it possible for the Sanyo CD3115HB to be modified in a similar way? The monitor works all right on the eight main colours. – **D.G. Shingles, Downham Market, Norfolk.**

● *It is, in principle, possible to convert this monitor to an analogue signal. However, this is only a first guess, and when it is done it may require further refinements to get the voltage levels right. However I would strongly caution you against attempting any such modifications if you are at all unsure of your constructional abilities.*

A TV monitor has high voltages – enough to kill – on the board even after the mains plug has been removed. It's the sort of project where I think if you have to ask how to do it then you are probably not capable of doing so.

Auto turn-off monitor

I OWN a Master Compact and an RGB colour monitor which keeps turning itself off. I can still see that the light for the on switch is glowing but the screen appears to have been switched off. The micro still works but I just can't see anything.

When I load a game the screen sometimes comes on, but after a few seconds goes blank again. Other times it just stays off. Have you any idea what may be wrong? – **Piers Ledger, Salfords Redhill, Surrey.**

● *There can be two causes for this. The first, and most likely, is that there is an intermittent fault in the lead or connector from micro to monitor. Next time it goes off try waggling the connectors at either end.*

The second cause could be in the monitor itself, and again it's of an intermittent nature. You could try, as Nasa would say, a little inertial shock or, in English, a thump. The cue here is to see if the tone of the whistling changes between picture and no picture. Having tracked down the area of the fault you must now proceed to effect a permanent cure by finding the faulty joint. If your monitor is at fault then I would advise professional help, as voltages inside monitors can be lethal.

On the agenda...

- ***Converting RGB to analogue***
- ***Unnecessary full address decoding***
- ***Interchanging discs between systems***
- ***The cure may be a thump***
- ***Automatic micro dialling***
- ***Too many resistors***
- ***Fit the missing link***
- ***Limited colour range***
- ***Intermittent disc fault***
- ***Mains or air-borne glitches***

Printer interference

COULD you please help me with the problem I am having with my Master 128 and Panasonic printer KX-P1081. If the printer is switched on when the Master is already on, either the keyboard of the Master becomes disabled or drive 0 of my 2 disc drives is activated.

On pressing Break, drive 1 is activated and then on cataloguing the discs I find the Libraries and Directories have been set to some spurious letter or number. The printer worked without any problems with my old BBC B and does so now with the Master, provided it is switched on first.

It appears the fault is caused by a surge from the printer on switch-on but a filter/spark quench circuit is fitted across the primary of the mains transformer. I checked the .047µfd capacitor, the largest of the three, by substitution but this was ineffective. This is fitted across the mains switch and each leg is decoupled to earth by two smaller unmarked values.

The Master is only about six months old and has been checked – IC 8 and another were replaced. My problem, however, still persists. I should also add that this condition is intermittent. I would be most grateful if you could offer a solution. – **R. Saunders, Bassingstoke, Hants.**

● *There are two ways that switch-on interference can be conveyed from your printer to micro. The first is via the mains, but what you have been doing is investigating the circuitry that protects your printer from a surge. What you need to do is protect your micro. If your problem is mains born you could try fitting a mains filter to your micro. The ones with inductors and capacitors work better than those with capacitors alone.*

However, perhaps the problem is not mains born – the disturbance may be being conveyed through your printer lead common signal. It could be that the common point on your printer is changing the potential between the on and off states. This would be due to the printer's power supply design and this could be due to earth leakaged problems in your printer caused by the decoupling capactitors concted to earth.

You could try removing them or isolating your printer's common line from the mains earth. I know I shouldn't be recommending this because each time I talk about earths and my attitude towards them I get inundated by letters from people who treat them just like a religion. The only sure fire solution would be to optically isolate your printer and micro.

A to D conversions

I'D like to connect an 8 bit/8 channel 7828 ADC to the BBC Micro 1MHz bus. My application needs to *grab* up to 8 knobs/pots with minimum overheads. Would full address decoding be too complex? – **Nik Kelly, Liverpool.**

● *There is no need to go to the complexity of adding this to the 1MHz bus as you can add it to the user port. The Body Build article in February 1987 issue shows you how to do this. This grabbed each of the eight channels in sequence. If you wanted ran-*

➤

dom access to the channels you would have to use the 1MHz bus. You only need to use full address decoding if other devices are to be connected to the bus at the same time.

DDFS compatibility

I RECENTLY changed my Solidisk 2.1 DDFS to the latest Watford 1.54T. When I try to load programs saved via the Solidisk the Watford one will not read the disc. It will, however, display the catalogue so is there any way of getting the Watford DDFS to operate on the Soldidisk saved disc, short of re-typing the programs? – **W. Jacsom, Cirencester, Glos.**

● *As far as I know there is no easy way of reading Solidisk saved files on the Watford DDFS. This is because Solidisk used a rather unusual set of data and address marks on the sector ID field. In theory it should be possible to write a routine to read this strange format but I don't know of anyone who has done one.*

Illegal calls

I AM thinking of building an automatic dialling system using my micro, rather than wearing my fingers down on my phone dial. Is there a way of generating the signals used in the dialling system and outputting them through a port to the telephone? Or is it possible to get a signal through the speaker which I can record and play back? – **D. Skeeles, Hitchin, Herts.**

● *While it is possible to have an automatic dialling system controlled from your micro it is illegal to fit a home made system to any British Telecom equipment. The nearest you can get is to have a BT approved modem with an autodial facility.*

Even if you are on one of the new automatic exchanges which uses tones as opposed to the pulsed system, it is still illegal to play a tape recording to effect the dialling.

Fitting two drives

I FOLLOW your contributions to *The Micro User* with great interest, but I now have a vested one because a fault has gradually developed since I fitted an extra drive to my Compact. This was bought about three years ago and I now seek your advice.

I fitted an external 5.25 in drive with built-in PSU about a year after I bought the micro. This was supplied by Watford Electronics specifically for the Compact and came with the usual arrangement of piggy-backing plug/socket arrangement on the data cable – these do not appear to be suspect.

When drive 1 is mounted there is a substantial delay – as long as 20 mins if the micro is completely cold but more typically about 5 mins. Escaping and repeating the command or repeated wiggling of anything within reach does not help.Could you please give me any idea what may be wrong? – **B.J. Wood, Chelston, Torquay.**

● *It sounds as if both your original drive and the extra one have the line-terminating resistors fitted. Hence the signals are being doubly ended and normally do not have enough "umph" to correctly operate the disc. You need to remove the terminating resistor pack from the drive that is closest to your micro – it looks a little like an IC in a socket and is usually labelled. With one of them removed your drives should behave normally.*

Too slow drive motor

MY BBC B issue 3 has developed a intermittent fault and I would be grateful if you could offer any advice. When I do any involving disc access, the drive motor runs immediately but nothing else happens until there is a definite drop in the tone of the motor, at which point the command is obeyed.

The delay is frequently up to 10 seconds and there has been the odd occasion when it has been more. I have tried several approaches and occasionally seem to have overcome the problem, but the cure has not lasted.

Quite by chance – while I typed this letter using Wordwise – I tried to do *CAT with a stopwatch ready, and it worked immediately. Yesterday it took all day.

The first time it returned to normal tried to blow an eprom, but got interspersed errors. When I unhooked the programmer the disc trouble had returned.

Four times since then I have apparently achieved a cure and in every case as soon as I hook up to the user port the trouble returns.

I appreciate that a cracked track on the board may be making and breaking, but I thought it best to contact you before inspecting the motherboard with a magnifying glass. Have you any idea what may be wrong? – **Norman P. Fay, Tickhill, Nr. Doncaster.**

● *The clue here is the change in tone of the disc drive motor. When the micro want disc access it turns the motor on and then waits until it comes up to speed. this is detected by the disc drive and signalled back to the micro, and it is this chain of events that is probably going wrong.*

If you open up the disc drive you will see the drive motor has a black and white pattern on it – a stroboscope track. Look at it under a fluorescent light and the pattern will appear stationary when the motor is up to speed.

If the motor is failing to get up to the proper speed probably the drive's power supply is sagging or the motor control transistor is failing.

You can normally tweak the speed, but it could be that the drive is not detecting the speed or not passing on the information correctly.

In either case you would need test equipment to locate the fault. Not that normally there are two stroboscope tracks – one for 50 cycles mains and the other for 60. We have the former in this country.

Composite video

I HAVE been offered the use of an RGB colour composite video monitor and have been told that it is RS170-compatible. Would it be suitable to use with either my BBC B or Master? – **Mr Kennedy, Godalming, Surrey.**

● *It can be used with either the BBC B or Master, but you will only get a monochrome picture unless you modify the micro to give composite colour output.*

It should be connected to the video out socket. Converting this socket to colour involves making link S39 on the BBC B. Some Masters are fitted with the link but on others you have to solder a capacitor to mix the colour signal with the rest of the video. If in doubt contact your dealer.

Monitor match

I HAVE an Amstrad CTM640 colour monitor which has a 6 pin DIN plug and I would like to know if it could be connected to an Archimedes. The pins are as follows:

Pin 1 – Red
Pin 2 – Green
Pin 3 – Blue
Pin 4 – Sync
Pin 5 – GND
Pin 6 – LVM

I hope you can help. – **D. Richardson, Wednesbury, West Midlands.**

● *It looks as though yours is a TTL RGBI monitor. This means that each gun can be off, half on or full on. As such it can only display a limited range of colours – 16 in all – but as the Archimedes does not supply a luminance signal it would only show eight.*

Given the quality of this type of monitor I would be very reluctant to connect one to my Archimedes even if it did work.

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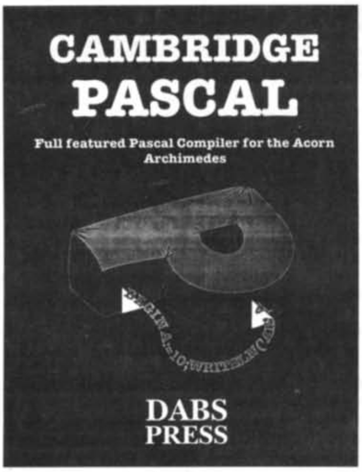

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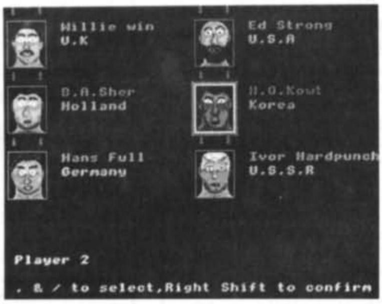

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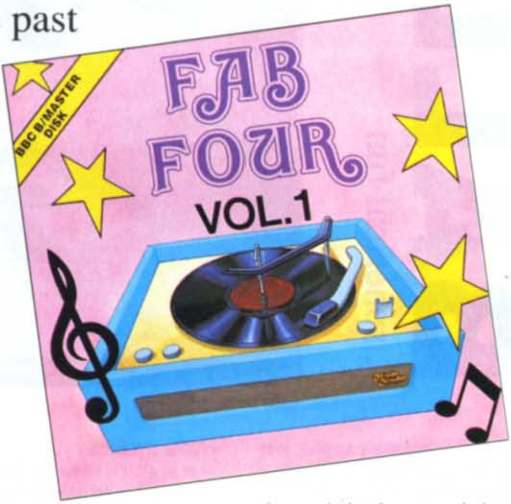
... a blast from the past



ON opening the parcel I discovered a sixties-style record player and a title reminiscent of a certain Radio One Sunday evening programme. But no, it was a compilation of two oldies and two spruced up Audiogenic games.

The instructions on the inlay are sufficient to tell you how to find your way around, though they could've been better set out.

Psycastria 2 is, unsurprisingly, the sequel to the original which was highly rated when first released three or four years ago. For me though it was the first time I've played it. Controlling a small spaceship aboard a massive spacecraft populated by 10 circular energy pods which whizz along the spacecraft, it's your mission to destroy each one before they shoot you.

The ship scrolls horizontally at Ayrton Senna hyperspeed as you try to shoot various bases on the ship. Though sometimes you can zoom along so fast that you crash into a tall building before you know what's going on. Between each level there is a bonus one where you must destroy aliens flying across the screen. Unfortunately, I have yet to see what happens then, as I still haven't quite got the knack.

The graphics are clear, colourful and well-detailed. The scrolling is completely flicker-free. Good sound incorporates a lively tune accompanying the high-score table, a nice special effect as you prepare to play and a jolly tune as you enter your name. Psycastria 2 is tricky but infuriatingly addictive as you just have to have another game to achieve a place on the high-score table or see what happens on the next level.

Thunderstruck 2 is an oldie in which you control an extremely unathletic spacesuited person who lumbers his way around a space complex. However, all sorts of wicked objects lie in wait to put a stop to your mission which is to find all four vital parts of the "Deacti-Unit". Of course there are many puzzles to be solved on the way, almost all of which involve locked doors and communicating robots.

The graphics are fairly good with cute but deadly characters moving horizontally or vertically with you jumping around the various ledges on the screen. The graphics bear a more than passing resemblence to SpyCat from Superior. Unfortunately, the sound consists of a series of bleeps and an end of game tune.

Thunderstruck 2 is a fairly average arcade adventure and doesn't really stand out from the crowd but kept me playing for several hours. The puzzles start off easy and become progressively more difficult.

Sphere of Destiny 2 takes over where the original left off. Once again you control a small spherical droid called Bruce who has unwisely taken up a mission to go through 64 space highways, all of which are constructed from small tiles, set out on five different rows. Each tile has its own individual colour which indicates how Bruce will react to it.

A yellow or blue tile will have no effect, red will slow him down, green the opposite, purple makes him jump, cyan reverses the controls, white gives a special bonus but black holes bring the time limit much closer.

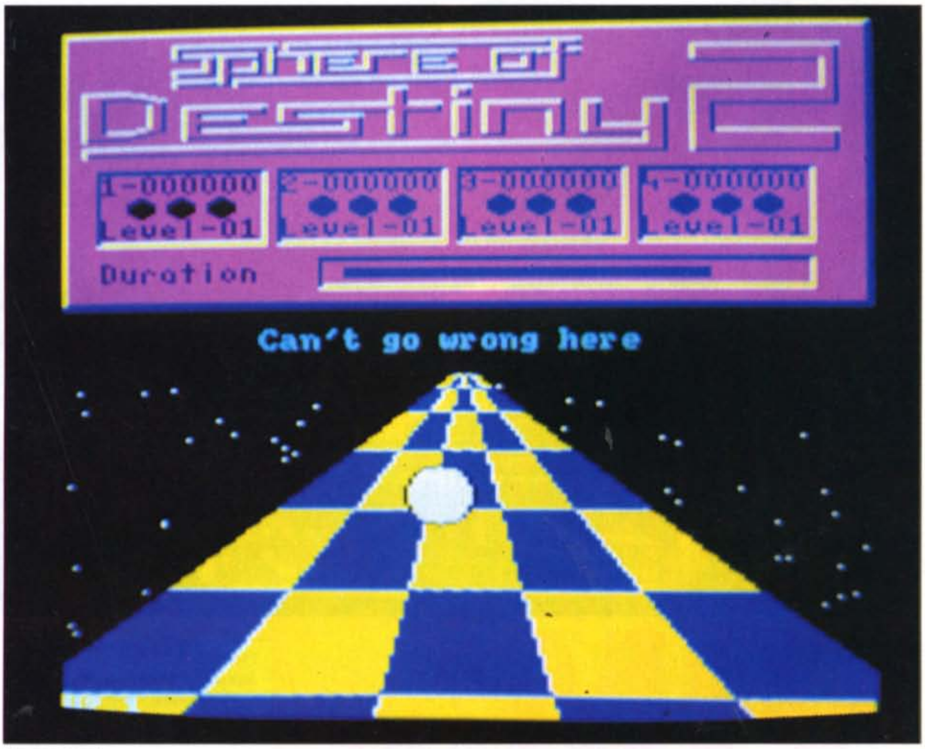
Sphere of Destiny 2 is initially interesting but, as the levels progress, they don't seem to become any more difficult to complete and become extremely repetitive.

Omega Orb is another Peter Scott oldie of 1987 vintage. This time featuring a cute creature who exhibits a beautiful squashy effect when he hits the ground. Moving your Orb around a lunar landscape, through caverns collecting *core pieces* is the basis of the adventure while evil creatures with matching intentions try to hinder your progress. Large animated sprites, used not only for moving creatures but also for many landscape features, allow you to walk being the scenery. A challenging game, though similar to Thunderstruck.

As four game compilations go this is a better-than-most collection, as they all provide a high enjoyment factor. I noticed the cover bears the legend Volume One. Will we be seeing a sequel?

Cheetah

Sound	*9*
Graphics	*8*
Playability	*9*
Value for money	*9*
Overall	*9*



The road ahead

BALLS!

... spherical fun

Price: £9.95 (tape) £12.95 (disc)
Supplier: Audiogenic, Winchester House, Canning Road, Harrow HA3 7SJ..
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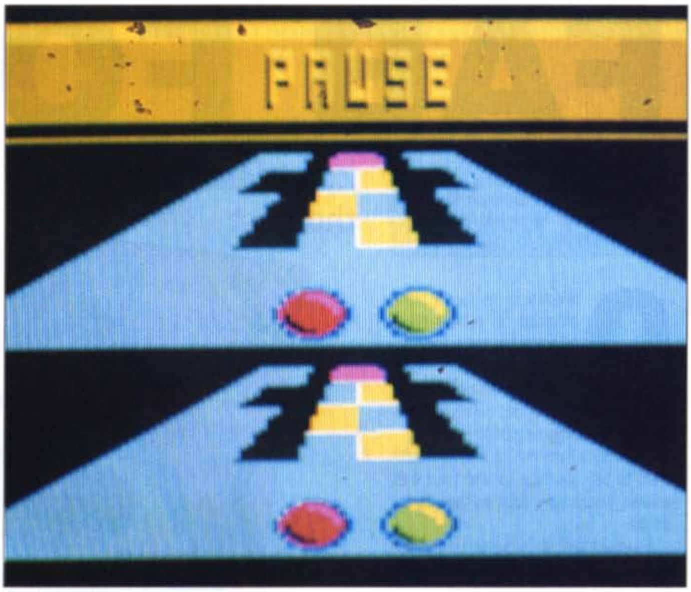

Ready to start

BALLS! is an interesting venture by a group of lower sixth form students from Queen Elizabeth's Hospital School in Bristol. As part of the Young Enterprise Scheme they have taken the rather bold step of writing a game and launching it into the notoriously cut-throat market.

Y.E.S. Marketing raised the capital for the project through the sale of shares. The shareholders were no doubt attracted by the thought of a sizable dividend dropping through the letter box when the game hits number one.

I must admit that when I received the game and read the accompanying letter I cringed in anticipation of what was to come. A bunch of pimply-faced youths had probably knocked together a half-baked game written in Basic as a way of skiving their way through a year of economics. Within seconds of booting the disc I realised that I couldn't have been more wrong.

With the title splashed across the screen in huge letters and a tuneful dittie accompanying it, a smooth horizontal scrolling routine began displaying the story line. I suspect that only those players with much patience and strong stomachs will see the complete message – I find that reading long horizontally scrolling messages induces a feeling of nausea.

Risking the loss of my evening meal I courageously sat through the entire message, the gist of which is as follows. In the year 2168 all of the mundane jobs were performed by robots, this inevitably led to much boredom and unrest amongst the inhabitants of Earth.

In an effort to relieve this boredom, the governments of the planet got together and built a large energy grid in space. By charging different squares with different types of energy, they could be given various properties: Purple ones cause the contestant's vehicle to bounce, white ones increase its speed, yellow ones stop it and black ones – gaps – are fatal.

The two brave contestants were strapped into their spheres and launched into the grid, the first to reach the far side – without dying – was the winner. As the number of fatalities increased, the number of volunteers decreased in proportion. To

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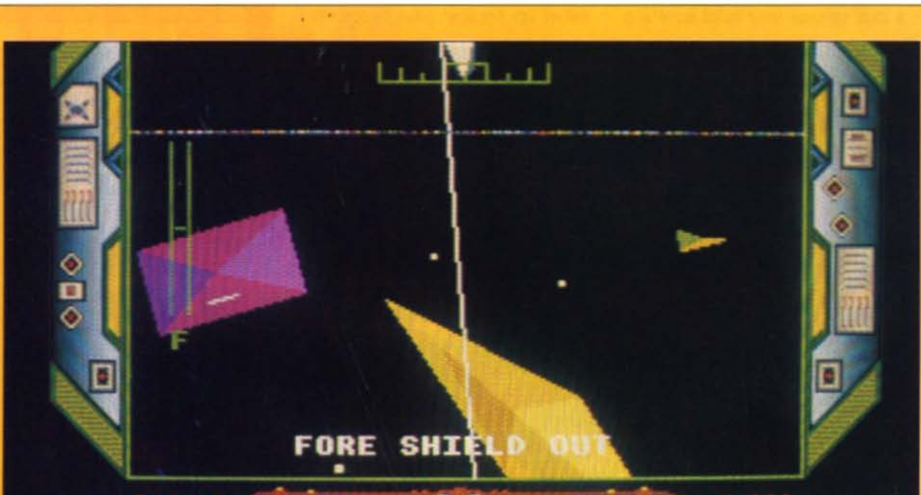
UIM...



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IN 1984 a game was released by Acornsoft that caused nothing short of a revolution in the BBC Micro games arena. Called Elite, it featured a clever cocktail of strategy and arcade gameplay never before seen in a software package.

Six years later the software company that showed such great support for the Arc in 1989 releases UIM, which could be most easily described as an unofficial sequel to Elite.

The Archimedes version follows the 8 bit release launched late last year. On the superior 32 bit micro's rendering of it the most obvious differences are the expanded use of colour and the fast, flicker-free, solid drawn 3D graphics.

Otherwise though, the plot and game details follow the same basic storyline of you engaging on a massive journey to seek out the UIM: Ultra-Intelligent Machine.

Now all civilisation has been forced to migrate to the world's oceans because of the greenhouse effect, and the once friendly self-replicating robots which helped establish this new watery way of life have corrupted and turned sour on anyone traversing the murky depths.

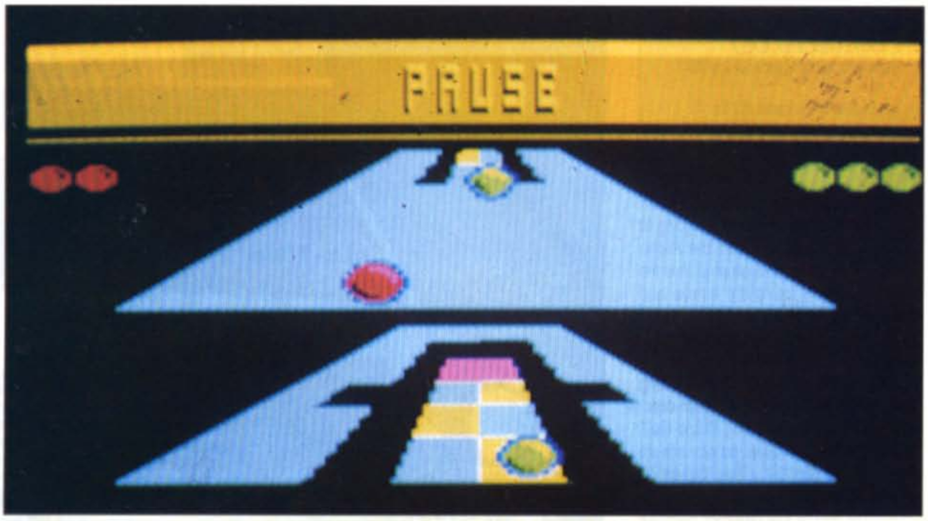
So the search is on for the foolishly lost UIM that will eradicate the mutated Replicants.

However, as with any quest, the search won't just involve working your way through encourage new contestants the organisers increased the prize money and while this boosted the number but it also resulted in much cheating and a further escalation of the death rate until, inevitably, the game was banned.

Reading between the lines you have probably already guessed the game's format. As a pilot of one of the game spheres, you must guide the craft along a moving highway of coloured rectangles as they as they scroll towards you at high speed. By clever planning you can use the properties of the different colours to enable you to leap otherwise impassable gaps in the grid.

Since there are very few original games any more, I delved through my collection of discs and dug out Gary Partis' Sphere of Destiny – a very similar, bounce the ball down the astral highway type of game. I had remembered this as being fast, but had forgotten just how fast – Sphere really flies along in comparison to Balls! But on the minus side, the ball in Sphere of Destiny is very two dimensional, whereas the same motion in Balls! is far more realistic – I much prefer the Y.E.S. game.

Another, quite major, enhancement is the inclusion of a two-player option. I am not referring to a *you go, then I go, then you go, and so on* feature, but a fully fledged simultaneous two-players-at-the-same-time action type of option. By dividing the screen horizontally the programmers have displayed each player's view one above the other – not bad for a bunch of school kids.



Clear, two-player action

Balls! is not an easy game to play, I had to tackle each level at least half a dozen times before I had figured out the correct combination of rights and lefts to reach the far side of the grid. But even when you know the correct route to follow, your timing has to be immaculate.

Lose one of your four balls and you are returned to the start of the current level – this can become incredibly infuriating – but since each grid is relatively small there was probably no alternative. The only concession to easing the players frustration is the "Start Level" facility. On the options screen you are offered the opportunity to specify the level on which you wish to start the next game – but only if you have already got that far during the current playing session.

Balls! is a game that deserves to do well. If Y.E.S. Marketing can put the same degree of professionalism into marketing the game as they have into programming it then their shareholders could be in for a handsome reward.

Jon Revis

Sound	*8*
Graphics	*8*
Playability	*8*
Value for money	*9*
Overall	*8*

---

the 65,000 or so ports, spread over 256 networks – far too simple.

Instead, you must build up your standard Black Satyr submarine – all U-Boat types are named after butterflies – through any number of methods of money management.

These include the standard buying and selling of goods between ports, the investment of movement of network dollars between shares and currencies of different underwater cities, and even the buying and manufacturing of your own raw materials.

Ports to trade between are sprinkled over each network's unique 3D map, and all have their own individual characteristics.

On the wilder side of life, finance can be found in piracy, bounty hunting and the all-important missions.

To progress between networks you must take on a remunerative task, which often involves the ferrying of badly-needed supplies between ports.

Once you have absorbed the wealth of complications and variables in the game – all fully detailed in the 41 page manual – gameplay out in the oceans can be controlled by keyboard, joystick or mouse.

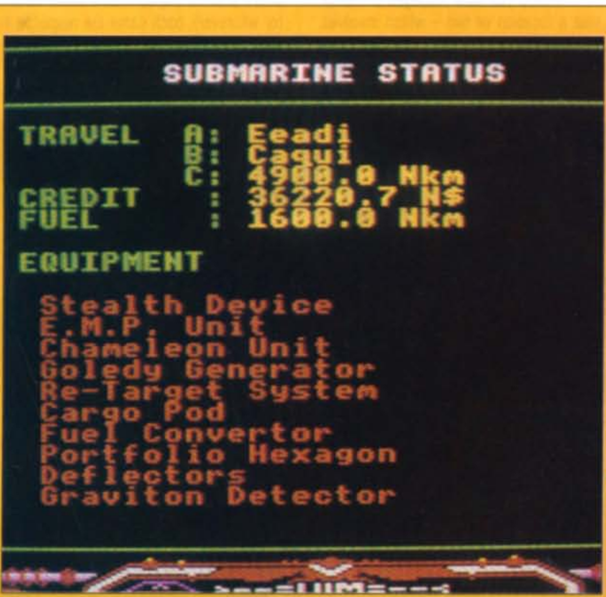
Although the mouse sensitivity can be adjusted, and the dampening effect on rolls and dives altered, movement is often frustrating. Joystick control is recommended.

The other submarines, although well drawn, are not so graphically impressive as some of the 3D objects in, say, Interdictor.

The quality of the sound certainly did not enthral me and – in view of the Arc's capabilities in this area – was rather disappointing.

I also found the instrument panel badly designed and a little sickly-coloured. The accuracy of the radar plotting of other subs in the surrounding water was also unreliable. A final concern with the game is the exclusion of what Elite featured as a Safety Zone around the port entrance marker buoy.

As UIM stands, no opportunity is given for users just to play with the controls and get used to them before entering combat.



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           SUBMARINE STATUS

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          B: Caqui
          C: 4900.0 Nkm
CREDIT     : 36220.7 N$
FUEL       : 1600.0 Nkm

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 Graviton Detector
```

As with the 8 bit release of UIM, the rather negative Orbital Flight between ports has been included – involving careful adjustments with the cursor keys to keep a cross central to the re-entry indicator, so that the correct trajectory is followed.

A re-entry module can be bought to save this discouraging hassle, but until sufficient cash is raised for its purchase the process presents as big a barrier to the new player of UIM as docking did in Elite.

To read the manual, the game is a sea of options, choices, possibilities and chances. When played, the infinite variations within the one program are emphasised much more.

UIM is a powerful game that justifies its higher price tag through guaranteed longer life.

Although it doesn't have the same polished feel as Elite, I suspect that its added twists will lead it to being bought and regarded as much more than just an Elite clone.

Matthew Ridd

Sound	*6*
Graphics	*8*
Playability	*8*
Value for Money	*8*
Overall	*8*

COPS

... let's be careful out there

Price: £19.95 (Archimedes) £13.95 (5.25in DFS) £14.95 (3.5in ADFS)
Requirements: Archimedes or any BBC Micro.
Supplier: Alpine Software, PO Box 25, Portadown, Craigavon BT63 5UT.

COPS is available on all Acorn disc formats but I'm going to concentrate on the Archimedes version which has the added facility of using the mouse and DeskTop features of that machine.

The screen is divided into two windows, the main one containing the text and any illustrations and the smaller one containing 26 icons for the mouse. All the main directions are available – including *IN* and *OUT* together with such basic commands as *TAKE, WEAR and INV.* I liked this set-up very much indeed.

Another feature that deserves particular mention is the way words from the screen text can be picked out via the mouse and made part of the command input. This means quite precise instructions can be given, although there are drawbacks.

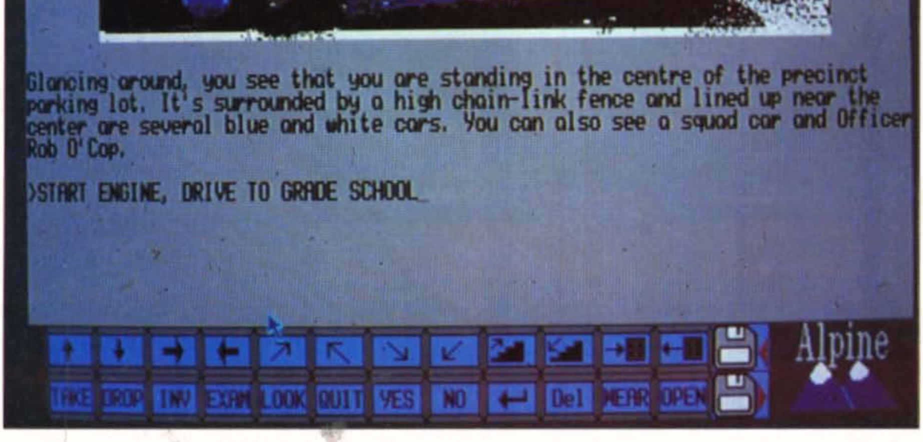
So there you are, fresh out of Police Academy, on your first roll call at the Hall Street precinct house, the Police Chief has been kidnapped and some villain has been stealing money from local school children.

You and your partner Rob O'Cop are assigned to the theft case and the rest of the officers to the kidnapping. From here on life gets increasingly complicated as you find your way around the initial locations.

Cops isn't what I'd call beginners' fare: It's a challenge for the moderately experienced adventurer who has acquired that degree of patience and pragmatism that means dying fairly frequently in the initial stages of a game.

Providing you have managed to memorise a location or two – which involves some careful work at the initial location – there comes a point where you have access to a patrol car. I took an age trying to get out of the car park: I'd started the engine – no problems there – but every time I entered the command *Drive South* (or whatever), back came the response *I need more information.*

It took me an age to realise that I needed to enter *Drive to (Location)* and that there were only two locations I could drive to anyway. If you've done the right thing at the beginning you should be able to work out what these two locations are.



```
Glancing around, you see that you are standing in the centre of the precinct
parking lot. It's surrounded by a high chain-link fence and lined up near the
center are several blue and white cars. You can also see a squad car and Officer
Rob O'Cop.

>START ENGINE, DRIVE TO GRADE SCHOOL_
```

In the early stages I found a number of ways to end my career nastily and also found that my buddy Rob provided a much-needed extra pair of hands. I also discovered it is possible to run out of petrol, that if one eats a bowl of extra-hot chilli disaster strikes unless you are near a loo, and that a policeman can be mugged.

One of my favourite SF stories is by Fritz Leiber *Gonna roll them bones* where a character shoots craps against Old Nick himself, and I soon discovered that a useful function key setting was one that had the dice a-rolling.

Cops is a pretty good adventure and worth buying, but there are a couple of minor drawbacks to the parser: At times it is rather finicky, and you can have a situation where the location description includes (say) a desk, but when you try to open it, you are told there isn't one.

The pictures aren't quite up to the standard set by Magnetic Scrolls adventures, but they are more than adequate and provide material clues to solving the adventure at times as well as enhancing the atmosphere. It's a good adventure: Buy it.

Mad Hatter

Presentation	*8*
Atmosphere	*9*
Graphics	*8*
Value for money	*8*
Overall	*8*

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Close shave for Sam

Hac Man regrets a missed opportunity before diving again into his devious collection of peeks and pokes in the wacky and wonderful world of games

Featuring...

Play it again Sam 12
Elite, Monsters,Sim

WELCOME to another column and another Happy Birthday to me – it's three years since I started writing for you. Before we press on into the pokes, amendments and conversions, however, here's a little tale of what might have been...

Every philatelist's dream is to discover that special stamp with an accidental printing fault that makes it unique and therefore worth a fortune. On the back cover of last month's issue of *The Micro User*, a similar printing fault very nearly appeared.

The lucky escape happened to Superior Sam's twelfth collection of goodies, and to Skirmish in particular. The problem was that the graphics lab Superior used to produce the design for the Play It Again Sam 12 advert inserted the Skirmish screenshot upside down.

Only a sharp pair of eyes prevented Sir Herbert of Hardingham, the hero of the piece, from making his return on his head. Of course, since every issue of *The Micro User* is priceless, this would not have caused a significant increase in its value. Even so, this misprint would have been fun to see.

The other games on the compilation are By Fair Means Or Foul, The Last Ninja and Blagger, the last updated with pause/restart, sound on/off, level jump and quit game facilities by yours truly.

The return of Skirmish gives me another legitimate chance to have a rave about it, so here goes: With one player against the micro it's brilliant, with two players against the micro and each other it's even better.

Still my favourite game – if you miss it the loss is yours.

Being Elitist

Elite is a game that needs no introduction. except to say that it's an absolute masterpiece that everyone should own. It was originally released by Acornsoft in 1984 on cassette and 5.25in disc. A very under-publicised disc-only version for the 6502 Second Processor sneaked out a year or so afterwards.

When Superior re-launched it in November 1986 they introduced yet another version. written to take advantage of the built-in sideways ram of the Master series machines.

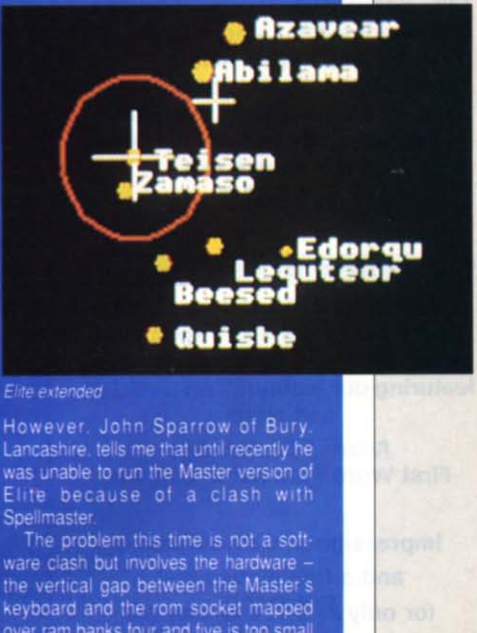
This version copies part of itself into sideways ram before it runs. so providing a larger game with some of the facilities of the 6502 Second Processor version. notably an increased number of colours.

Incidentally. the 6502 Tube Elite is also provided on the Superior disc of Elite. so a Master Turbo owner can take his pick.

The Master version of Elite uses ram bank six to store its data. a choice that has never caused me any problems.

```
 10 REM Sideways ram bank 4 conversion
for Master Elite
 20 REM by John Sparrow
 30 REM (C) The Micro User
 40 REM
 50 IF PAGE=&3000 GOTO 100
 60 FOR I%=0 TO (TOP-PAGE) STEP 4:I%!&3
000=I%!PAGE:NEXT
 70 *KEY0 PAGE=&3000|M END|M OLD|M RUN|
F|M
 80 VDU 21:*FX 138,0,128
 90 END
100 MODE 7:PRINT "Please insert Elite d
isc (Superior version, side 2) and pres
s any key...";*FX 15,0
100 G%=GET:*LOAD M128ELT
110 ?2484=96:CALL 2416
120 bank=4:?&EAD=bank:?&EB6=bank:?&EE5=
bank+48:?&F2F=bank:?&F38=bank
130 CALL &E43
```

Listing I. Sideways ram bank four onversion for Master Elite



Elite extended

However. John Sparrow of Bury. Lancashire. tells me that until recently he was unable to run the Master version of Elite because of a clash with Spellmaster.

The problem this time is not a software clash but involves the hardware – the vertical gap between the Master's keyboard and the rom socket mapped over ram banks four and five is too small to accept the Spellmaster rom.

Consequently. John had to fit Spellmaster in the rom socket mapped over ram banks six and seven. thereby losing the ability to play the Master version of Elite.

This solution was not particularly satisfactory. so John has written a short routine that will be invaluable to anyone in the same boat. Simply type in Listing I. save it on to one of your own blank discs. type RUN and follow the on-screen instructions.

The game will appear to load as normal. but using ram bank four instead of six. Of course. if bank four is already in use. change the value of *bank* accordingly

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Monstrous omission

Monsters is one of the all-time classic BBC Micro games, so it is good to see it making a return to the games scene to delight the latest generation of games players. However, as I mentioned in the January column, I had always found the dig and fill keys rather difficult to use.

I did mention that there was a possibility of the game being re-released with a change of keys – Return to dig and Shift to fill perhaps – which are the keys that I use myself. Consequently, I was a little disappointed to see that the playing keys are unchanged. Never mind, that's where this column comes in...

Type in Listing II and save it on your own blank tape or disc. To amend the dig and fill keys to Return and Shift respectively, just type RUN and follow the on-screen instructions. If, however, you prefer to use keys other than the above, you will have to change the key values, given in lines 230 to 280, to the values of your preferred keys, before saving the program.

For further details please see the feature in my January column on redefining Gunsmoke's playing keys.

I have also incorporated a facility to allow you to include your own name and high score in the Monsters high-score table, so that it will appear every time the listing is used to load the game. Please note that the entries for the scorers' names shouldn't be longer than 19 characters. If they are, only the first 19 will be displayed.

Incidentally, my program detects which version of Sam 11 is running and adjusts itself accordingly. Clever little me.

```
 10 REM Monsters key redefinitions
 20 REM and high-score table editor
 30 REM Play It Again Sam 11 (all versi
ons)
 40 REM by Hac-Man 1989
 50 REM (C) The Micro User
 60 REM
 70 IF PAGE=&4700 GOTO 120
 80 FOR I%=0 TO (TOP-PAGE) STEP 4:I%!&4
700=I%!PAGE:NEXT
 90 *KEY0 PAGE=&4700|M END|M OLD|M RUN|
F|M
100 VDU 21:*FX 138,0,128
110 END
120 ENVELOPE 1,10,-1,-1,0,2,2,1,120,0,0
,-120,120,120
130 ENVELOPE 2,2,0,0,0,1,1,1,120,-120,-
120,-120,120,0
140 ENVELOPE 3,2,-1,-1,-1,255,255,255,1
20,0,0,-120,120,120
150 ENVELOPE 4,3,0,0,0,1,1,1,120,-5,-5,
-10,120,90
160 osargs=&FFDA:osword=&FFF1
170 DIM BL%8:CHAR%=224:PROCdefine("Game
Ovr")
180 A%=0:X%=&70:Y%=0:F%=USR(osargs) AND
 &FF
190 MODE 7:PRINT "Please insert Sam 11
";
200 IF F%=1 PRINT "tape"; ELSE PRINT "d
isc";
210 PRINT " and press any key...";:*FX
15,0
220 G%=GET:IF F%=1 PROCtape ELSE IF F%=
4 PROCdisc ELSE IF F%=8
PROCadfs
230 ?&353A=&9E:REM move left (Z)
240 ?&353B=&BD:REM move riht (X)
250 ?&353C=&97:REM move down (?)
260 ?&353D=&B7:REM move up (*)
270 ?&353E=&B6:REM dig (Return)
280 ?&353F=&FF:REM fill (Shift)
290 CLEAR:DIM N$(8),S(8)
300 S(1)=&029320:N$(1)="Hac-Man's first
 go!"
310 S(2)=&001000:N$(2)="Superior/Acorns
oft."
320 S(3)=&001000:N$(3)="Superior/Acorns
oft."
330 S(4)=&001000:N$(4)="Superior/Acorns
oft."
340 S(5)=&001000:N$(5)="Superior/Acorns
oft."
350 S(6)=&001000:N$(6)="Superior/Acorns
oft."
360 S(7)=&001000:N$(7)="Superior/Acorns
oft."
370 S(8)=&001000:N$(8)="Superior/Acorns
oft."
380 PROCtable
390 PRINT '"Press any key to continue..
.";:G=GET:CALL &4600
400 END
410 DEFPROCdefine(A$)
420 FOR I%=1 TO LEN(A$):PROCchar(ASC(MI
D$(A$,I%,1))):NEXT
430 ENDPROC
440 DEFPROCchar(C%)
450 ?BL%=C%:X%=BL%:Y%=BL% DIV 256:A%=10
:CALL osword
460 FOR K%=1 TO 5 STEP 4:VDU 23,CHAR%
470 FOR J%=0 TO 7:VDU BL%?(K%+J% DIV 2)
:NEXT
480 CHAR%=CHAR%+1:NEXT
490 ENDPROC
500 DEFPROCtape
510 PRINT'
520 !&900=&208D26A9:!&904=&8D09A902
530 !&908=&0EA90221:!&90C=&F42004A2
540 !&910=&A01FA2FF:!&914=&FFF72009
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580 !&930=&03CA8DFE:!&934=&AA68A868
590 !&938=&00602868:!&93C=&21434148
600 CALL &900
610 ENDPROC
620 DEFPROCdisc
630 ?1024=96:*LOAD MON1
640 ?1095=96:CALL 1024
650 ENDPROC
660 DEFPROCadfs
670 *MOUNT
680 !50949=8225:*RUN MON1
690 ENDPROC
700 DEFPROCtable
710 FOR X=1 TO 8
720 N=X*20+&37E9:$N=LEFT$(N$(X),19)
730 S1=S(X) DIV &10000:S2=S(X) DIV &100
 MOD &100:S3=S(X) MOD &100
740 H=X+&37CF:?H=S3:?(H+8)=S2:?(H+16)=S
1
750 NEXT
760 ENDPROC
```

Listing II: Monsters key redefinitions and high-score table editor

Sim-adulation

Sim by Viper Software is one of the less well-known arcade adventures, which is a great pity because it is really very appealing with bright, colourful graphics and a catchy little ditty that will drive to distraction everyone around you.

I have been known to infuriate my good lady by humming it repeatedly, without even really realizing it. That, however, is another story...

Possibly the reason for Sim's comparative lack of success is that controlling your game character is quite definitely an acquired art, one that is not easily mastered.

When this is combined with the fact that anything that moves – of which there are a great many on the first few screens – will kill you instantly, only the most persistent will refrain from throwing the game into the nearest cupboard, never to be seen again.

Nevertheless, it is delightful, and perseverance is well rewarded.

In its original form, Sim does not work correctly on the Master, producing instead a display in which all screen output is squashed into a single line at the top of the screen. This will be familiar to Master owners who own copies of Castle Quest, Atic Atac, the original Aardvark Frak! and many of the Icon and early Tynesoft games.

The problem is that, like Chrysalis for which I provided a fix in the December 1987 column, Sim makes direct use of the BBC B's screen character row multiplication table, located at &C375 in the B's operating system rom.

The Master, however, calculates screen coordinates as it goes along, and consequently does not use such a table. Therefore, any program that attempts to use the row multiplication table will not set up its screen display correctly.

Listing III provides a patch seen in a couple of previous columns to set up a dummy row multiplication table at &C375 in the Master's filing system ram, which is then read by the program, resulting in a correctly set-up screen display.

```
 10 REM Sim to Master conversion
 20 REM by Hac-Man 1989
 30 REM (C) The Micro User
 40 REM
 50 acccon=&FE34:?acccon=&18:REM allow
access to filing system ram
 60 FOR J%=0 TO 31:K%=J%*640:P%=(2*J%)+
&C375:[OPT 2
 70 EQUB K% DIV 256 : EQUB K% AND 255
 80 ]:NEXT
 90 MODE 7:PRINT "Please insert Sim tap
e and press any key...";*FX15,0
100 G%=GET:PRINT':CHAIN""
```

Listing III: Sim to Master conversion

Playing possum

THE BEEB BODY BUILDING COURSE

Mike Cook continues his Body Building course by showing how to make a BBC Micro much more accessible to disabled people

THE personal computer has been perhaps the greatest liberator this century for many physically handicapped people. It has allowed them to develop much potential and has acted as an unprecedented communications channel.

Much of the work has been done by using so-called *possums* – devices made to suit the individual which allow him or her to use whatever motor control they have to be used to interact with the micro. A typical possum device might have two separate sensors, like breath suck and blow or micro switches triggerd by head movement. One switch is used to cycle through a number of options and the second is used to select the desired option.

The only trouble is that software normally has to be customised to allow possum interaction. This month I want to look at a system capable of operating almost any program via one of these devices.

In order to display options most need to have a section of the screen devoted to them. If the software you are trying to run did not have this in mind it can be tricky trying to change it. In order to get round this limitation we need some form of auxiliary device to display our choices.

This needs to be controlled as a background task, transparent to any application running. Finally when the background task detects a choice has been made it has to insert it into the input buffer. In this way the micro will think the input came from the keyboard.

So our first job Is to make an auxiliary display device capable of showing the full alphabet. Fortunately there is a low cost device available in the form of an LED matrix display.

This is an array of LEDs arranged as seven rows and five columns.

Using this matrix we can show all the normal character set. A device containing a bank of 35 LEDs might be thought to have 80 connections, but in fact it only has 12. This is because all the column connections and all the row connections are common. This saves on connections but it means that in order to have independent control of individual LEDs you have to resort to multiplexing.

In this case multiplexing involves flashing the rows of the matrix, one at a time, to achieve the illusion that they are all on at once. This was the basis of the Magic Wand article which appeared in the July 1989 issue of *The Micro User*. However, then we were only flashing seven LEDs. This time we have to cope with 35. Surprisingly enough we can still squeeze the control of all these lights on to the user port.

To do this we control the LED columns directly from five bits of the user port, leaving seven rows to be controlled by the remaining three bits. This is not as difficult as it might at first seem, because we only ever want one of the rows to be on at any time, and as we can get eight different combination of states out of three lines we have a state to spare: In fact we can use it to turn the display off altogether.

The conversion from user port state to row command is performed by a binary to decimal decoder, a 74LS42. This leaves two control lines on the User Port free for connection to the possum sensors. Figure I shows the circuit of the display device. The matrix I have used is of the anode row type, which means that to light it up you have to connect the row lines to a positive voltage and the column lines to earth. Note that you can get anode column matrices, but these would not work in this circuit.

Upside down

The outputs of the 74LS42 are all normally high except for the one whose binary value is on the three input lines. So a zero out of this chip has to connect the row up to 5 volts. This is done using a PNP transistor.

I like to call these *upside down transistors* as they behave in exactly the opposite way to the more usual NPN transistor. That is, if you connect the emitter to the positive supply voltage, the transistor will only turn on when the base is taken to a lower voltage – more negative than the emitter.

We connect the emitter to the +5V line so a zero on the base turns the transistor on and connects the row to +5V. On the other hand, the column connections are taken to NPN transistors, and when these receive a logic 1 from the user port they turn on and connect the columns to ground.

Note that there is a 180Ω resistor in the circuit to limit the current flowing through the diode. The smaller this resistor, the more current will flow and the brighter the LED will be.

It could be reduced even further, as the LEDs will only be pulsed and they can withstand more current that way. However, we do not do this as a safeguard against damage occurring if the scanning program were to stop and leave one row of LEDs on permanently.

Note that the PNP transistors have to be capable of passing enough current for up to five LEDs, whereas the NPN transistors only have to carry the current for one light at a time.

Construction is not critical, but I have laid out a printed circuit and this is available along with all the other components as Body Build pack No. 57.

Having built the hardware we now have to drive it. Listing I shows a simple program to check it out. It first lights each LED in turn to make sure they are all working and then when you press the spacebar it will display the letter A.

Listing II is more complex and this installs a background task driving the display to show the numbers from 0 to 9 and a back arrow for a Return. Each time CB1 is shorted to earth the number changes, and when CB2 is shorted the displayed number is inserted into the input buffer.

We need to store all the bit patterns to make up the matrix characters. This is done in lines 130 to 280. The data statements control the shape of each character – see Figure II to see how they are made up. The last entry in each character is the Ascii value you want to assign it. By doing this you can have any mix of characters appearing in any order.

Note that line 130 defines the number you propose using. For simplicity I have used one data statement for each. The program works by having timer T1 generate a regular interrupt. When this occurs the micro changes the row to output. As the data for the character also contains the row information, we need to get the next entry in the lookup table.

When a CB1 interrupt is detected eight is added to the lookup table pointer stored in &72 and &73. If this value equals the end of the table – stored in &78 and &79 – the program restores the start address of the table, stored in &70 and &71. When CB2 is triggerd the Ascii value associated with the current character is fetched and inserted into the keyboard buffer with a osbyte call.

Unfortunately we cannot use the character set already stored in the operating system rom because that is based on an 8 by 8 matrix, and while most characters will fit in a 7 by 6 format, 7 by 5 is just too narrow.

Contact bounce

When the program is run you will see a 0 being displayed; short out CB1 to change this. You might notice that it appears to move on more than one place, if it does you are experiencing contact bounce – that is, you are not making a clean connection but a number of very rapid ones.

If you have the same problem with your microswitches try placing a capacitor across the contacts.

As the program in Listing II installs the patch there is no need to run it each time you want the patch installed. All you have to do is to save the area of memory associated with the patch using *SAVE.

Instructions regarding which numbers to use are printed out when you run the program. You only have to type *Mpatch to load and initialise it – this could be part of a startup routine held in the !Boot file.

I don't have the space to include a full driving implementation of this display device, but you could just extend the lookup tables in Listing II. However, cycling through the whole alphabet both in upper and lower case characters in order to select the one you want would be somewhat tedious.

Instead you can adopt a much more economic strategy. As any letter or number can be part of a 64 character set, you can choose it by six decisions. Using this strategy you would use possum input one to toggle between a zero or one in the most significant bit, indicating upper or lower case. Then use input two to move on to the next bit where the same procedure was repeated.

More training

When input two was activated after selecting the last bit the resulting letter would be entered into the buffer. This would require considerably less effort to use, but would require a little more training also it would be a good idea to include a large chart so the user could more easily home in on the character required.

The lookup table for a full character set like this would take up about 512 bytes so perhaps it might be better to install it in a sideways rom so leaving the maximum amount of room for your application.

Well there you have it Possums, as a famous Dame might say, an independent, multiplexed, single-character display device capable of being used to ease the interaction of the disabled with the micro.

● *See you next month – with something completely different.*

➤

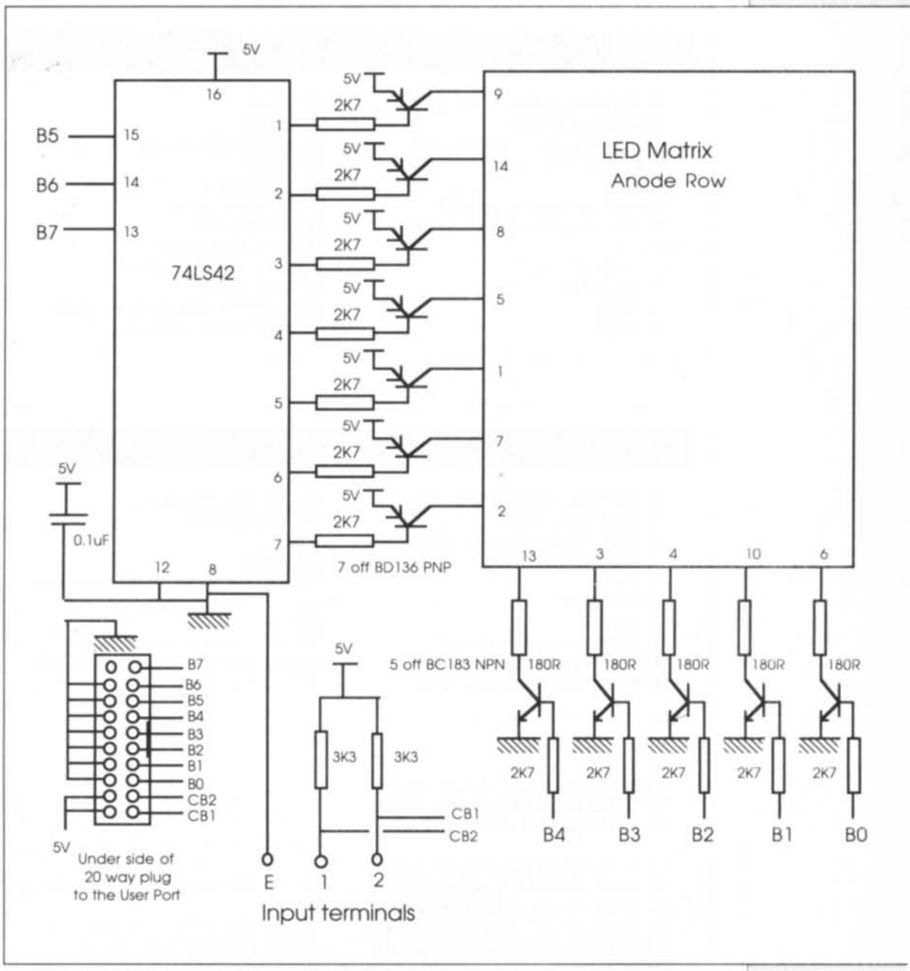
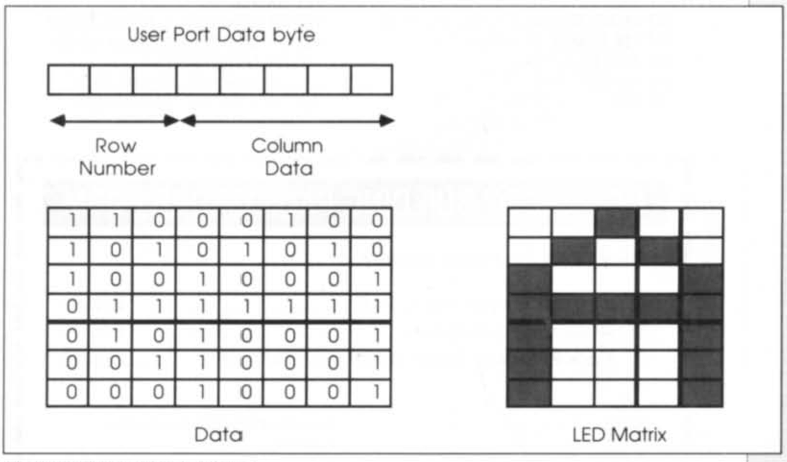


Figure I: Circuit of the display device



1	1	0	0	0	1	0	0
1	0	1	0	1	0	1	0
1	0	0	1	0	0	0	1
0	1	1	1	1	1	1	1
0	1	0	1	0	0	0	1
0	0	1	1	0	0	0	1
0	0	0	1	0	0	0	1

Figure II: Makeup of the matrix data

Listing I

```
   10 PRINT"Beeb Bodybuilding Course"
   20 PRINT"March 1990"
   30 PRINT"LED Matrix display test"
   40 PRINT"By Mike Cook"
   50 PRINT
   60 PRINT"Now testing each LED"
   70 PRINT"Press space bar to display a
 character"
   80 DIM D%(6)
   90 ?&FE62=&FF
  100 REPEAT
  110 A%=&E0
  120 REPEAT
  130 B%=&20
  140 A%=(A%-&20) AND &E0
  150 REPEAT
  160 B%=B% DIV 2
  170 ?&FE60=A% OR B%
  180 K%=INKEY(10)
  190 UNTIL B%=1 OR K%<>-1
  200 UNTIL A%<&20 OR K%<>-1
  210 UNTIL K%<>-1
  220 PRINT"Now displaying character"
  230 PRINT"Press Escape to end"
  240 FOR A%=0 TO 6
  250 READ D%(A%)
  260 NEXT
  270 REPEAT
  280 FOR A%=0 TO 6
  290 ?&FE60=D%(A%)
  300 NEXT
  310 UNTIL FALSE
  320 REM DATA FOR CHARACTER
  330 DATA &11,&31,&51,&7F,&91,&AA,&C4
```

Listing II

```
   10 PRINT"Beeb Bodybuilding Course"
   20 PRINT"March 1990"
   30 PRINT"LED Matrix patch installer"
   40 PRINT"By Mike Cook"
   50 PRINT
   60 PROC_PATCH
   70 CALL ENT
   80 PRINT"Patch now installed"
   90 PRINT"To save the patch use:-"
  100 PRINT"*SAVE Mpatch A00 ";~EP;" ";~
ENT
  110 END
  120 DEF PROC_PATCH
  130 NC%=11
  140 DATA&E,&31,&51,&71,&91,&B1,&CE,&30
  150 DATA&E,&24,&44,&64,&84,&AC,&C4,&31
  160 DATA&1F,&30,&48,&66,&81,&B1,&CE,&3
2
  170 DATA&E,&31,&41,&66,&82,&A1,&DF,&33
  180 DATA&2,&22,&5F,&72,&8A,&A6,&C2,&34
  190 DATA&E,&31,&41,&61,&9E,&B0,&DF,&35
  200 DATA&E,&31,&51,&7E,&90,&A8,&C7,&36
  210 DATA&8,&28,&48,&64,&82,&A1,&DF,&37
  220 DATA&E,&31,&51,&6E,&91,&B1,&CE,&38
  230 DATA&1C,&22,&41,&6F,&91,&B1,&CE,&3
9
  240 DATA&2,&24,&48,&7F,&88,&A4,&C2,&D
  250 FOR A%=&A00 TO (&A00+NC%*8)-1
  260 READ P%
  270 ?A%=P%
  280 NEXT
  290 FOR A%=0 TO 2 STEP 2
  300 P%=&A00+NC%*8
  310 [
  320 OPT A%
  330 \ Entry point for initialise routi
ne
  340 .ENT
  350 SEI \ Disable interrupts
  360 LDA #&FF:STA &FE62 \ All outputs
  370 \ Set up inital memory values
  380 LDA #&0A:STA &71:STA &73 \ Look up
 table
  390 LDA #0:STA &70:STA &72:STA &74
  400 LDA #((&A00+8*(NC%)) MOD 256)
  410 STA &78
  420 LDA #((&A00+8*(NC%)) DIV 256)
  430 STA &79
  440 LDA #0:STA &74 \ Initial offset
  450 LDA &206:STA &76 \ Move vector
  460 LDA &207:STA &77
  470 LDA #(ISR MOD 256):STA &206
  480 LDA #(ISR DIV 256):STA &207
  490 LDA #&40:STA &FE6B
  500 LDA #&C \ Timer value
  510 STA &FE64:STA &FE66
  520 STA &FE67:STA &FE65
  530 LDA #&20:STA &FE6C \ Control line
interrupts
  540 LDA #&D8:STA &FE6E \ Enable interr
upts
  550 CLI
  560 RTS
  570 .ISR
  580 PHA:TYA:PHA:TXA:PHA
  590 LDA &FE6D \ Interrupt flag reg
  600 BPL NUS \ Branch if not out interr
upt
  610 \STA &FE6D \ Clear interrupts
  620 ASL A:ASL A \ Get T1 flag into car
ry
  630 BCC LC1 \ Not timer 1 Look at CB1
  640 INC &74
  650 LDA #7:CMP &74:BNE NR
  660 LDA #0:STA &74
  670 .NR LDY &74
  680 LDA (&72),Y \ Get next row
  690 STA &FE60 \ Display it
  700 LDA #&40:STA &FE6D \ Clear interru
pt
  710 JMP NUS
  720 .LC1 ASL A:ASL A
  730 BCC LC2 \ Look at CB2
  740 LDA #&10:STA &FE6D \ Clear carry
  750 LDA &72:CLC:ADC #8
  760 STA &72:BCC NI1
  770 INC &73
  780 .NI1 \ Look to see if we need to r
ap round
  790 LDA &73:CMP &79:BNE NUS
  800 LDA &72:CMP &78:BNE NUS
  810 LDA &70:STA &72
  820 LDA &71:STA &73
  830 JMP NUS
  840 .LC2 \ Look at CB2 flag
  850 ASL A:BCC NUS
  860 LDA #&8:STA &FE6D \ Clear carry
  870 LDY #&7 \ Point at ASCII value
  880 LDA (&72),Y
  890 TAY:LDX #0:LDA #153
  900 JSR &FFF4 \ Insert char into buffe
r
  910 .NUS
  920 PLA:TAX:PLA:TAY:PLA
  930 JMP (&76) \ RETURN
  940 .EP
  950 ]
  960 NEXT
  970 ENDPROC
```

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THE MICRO USER

READERS' SURVEY

This page is vital. We need YOUR answers to these questions in order to tailor future issues to meet YOUR needs. If you don't want to tear out the page, a photocopy would be just as welcome!

ABOUT YOU

How old are you?

☐ Under 11 ☐ 16 - 18 ☐ 23 - 30 ☐ 40 - 50
☐ 11 - 15 ☐ 19 - 22 ☐ 31 - 39 ☐ Over 51
Sex? M / F Occupation?

What area of micros or computing interest you?

	Very much	*A little*	*Not at all*
Business	☐	☐	☐
Arcade games	☐	☐	☐
Adventures	☐	☐	☐
Comms	☐	☐	☐
Programming	☐	☐	☐
Hardware	☐	☐	☐
Future Technology	☐	☐	☐

How do you rate your knowledge of:

	None	*Poor*	*Average*	*Good*	*Excellent*
Basic programming	☐	☐	☐	☐	☐
6502 Machine code	☐	☐	☐	☐	☐
ARM code	☐	☐	☐	☐	☐
Hardware	☐	☐	☐	☐	☐

YOUR MICRO

What micro(s) do you own or use?

☐ BBC Model A or B ☐ BBC Master ☐ Archimedes
☐ BBC Compact ☐ Electron ☐ BBC A3000

How long have you had a BBC Micro?

☐ Under 1 year ☐ 1-2 years ☐ 3-4 years
☐ 2-3 years ☐ 4-5 years ☐ Over 5 years

Do you have any other micro? Yes/No
Which one(s)?

Are you thinking of buying another computer? Yes/No
Which one?

What type of hardware would you like next for your micro?

What type of software are you most likely to buy next?

What do you use your computer for (fill in your own ideas in the spaces at the end of the list)?

	Only	*Mostly*	*Some*	*Not much*	*Never*
Arcade games	☐	☐	☐	☐	☐
Adventure games	☐	☐	☐	☐	☐
Programming	☐	☐	☐	☐	☐
Business	☐	☐	☐	☐	☐
Own letters	☐	☐	☐	☐	☐
Home accounts	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
....	☐	☐	☐	☐	☐
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THE MAGAZINE

How long have you been reading *The Micro User*?

☐ 0-3 months ☐ 4-6 months ☐ 7-12 months
☐ 1-2 years ☐ 2-3 years ☐ 3-4 years
☐ 4-5 years ☐ 5-6 years ☐ From issue 1

How often do you buy *The Micro User*?

☐ Every issue ☐ 1 in 2 ☐ Less regularly

How do you get *The Micro User*?

☐ Subscription ☐ Newsagent
☐ Computer dealer ☐ A friend

How many other people read your copy of *The Micro User?*

☐ None ☐ 1 ☐ 2 ☐ 3 ☐ more than 3

What other computer magazines do you regularly buy?

What do you like most about *The Micro User*?

What do you like least about *The Micro User*?

Which program listings do you type in?

	Usually	*Sometimes*	*Never*
Games	☐	☐	☐
Utilities	☐	☐	☐
Tutorials	☐	☐	☐
Educational	☐	☐	☐

Please circle the number which matches your level of interest in the following subjects *(0 least – 9 most)*:

News	0	1	2	3	4	5	6	7	8	9
Software reviews	0	1	2	3	4	5	6	7	8	9
Hardware reviews	0	1	2	3	4	5	6	7	8	9
Body Building	0	1	2	3	4	5	6	7	8	9
Communications	0	1	2	3	4	5	6	7	8	9
Problems solved	0	1	2	3	4	5	6	7	8	9
Mad Hatter	0	1	2	3	4	5	6	7	8	9
Hac Man	0	1	2	3	4	5	6	7	8	9
Letters	0	1	2	3	4	5	6	7	8	9
Education	0	1	2	3	4	5	6	7	8	9
Business	0	1	2	3	4	5	6	7	8	9
Games programs	0	1	2	3	4	5	6	7	8	9
Utilities programs	0	1	2	3	4	5	6	7	8	9
Archimedes & A3000	0	1	2	3	4	5	6	7	8	9
Offers	0	1	2	3	4	5	6	7	8	9

Indicate any articles or series you would like to see in future editions of *The Micro User*.

Any other comments you would like to make about us?

Thanks for filling in this survey. Please send this page (or a photocopy of it) to: Reader Survey, *The Micro User*, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

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Clares Micro Systems offers the chance to reach for the skies. Here's your opportunity to start along the path to having your own private pilot's licence. Two trial lessons are available at an airport of your choice.

Fourth Dimension likes to keep its corporate feet firmly on the ground and asks four readers to enjoy a day to remember at Oulton Park Racing Centre in Cheshire.

A really full day's racing awaits the winners – briefings, driving analysis, personal instruction, sports saloon racing and finally timed laps in a Formula First.

And there are lots of runners-up prizes, including the Voltmace Delta-Cat joystick and copies of Interdictor, E-Type and Superior Soccer.

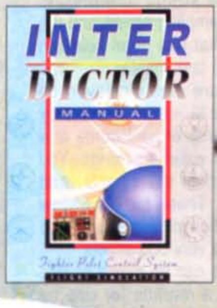
WHAT TO DO

With over £1,500 of prizes up for grabs we have devised a set of questions to test your knowledge. Simply complete the entry form, answering as many questions as you can. Then send this to us, to arrive no later than March 30.

THE QUESTIONS

1. Name the very first Acorn computer.
2. APL is a programming language but what do the initials stand for?
3. How many times bigger is the memory of a basic BBC A3000 than a standard Model B?
4. In what was Archimedes when he found his inspiration?
5. Who were the two men who started Acorn Computers?
6. What is the difference between Formula One and Formula First cars?
7. How many engines does Concorde have?
8. Who was responsible for the Hand of God goal during the last World Cup?

...and the screen



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6. ....
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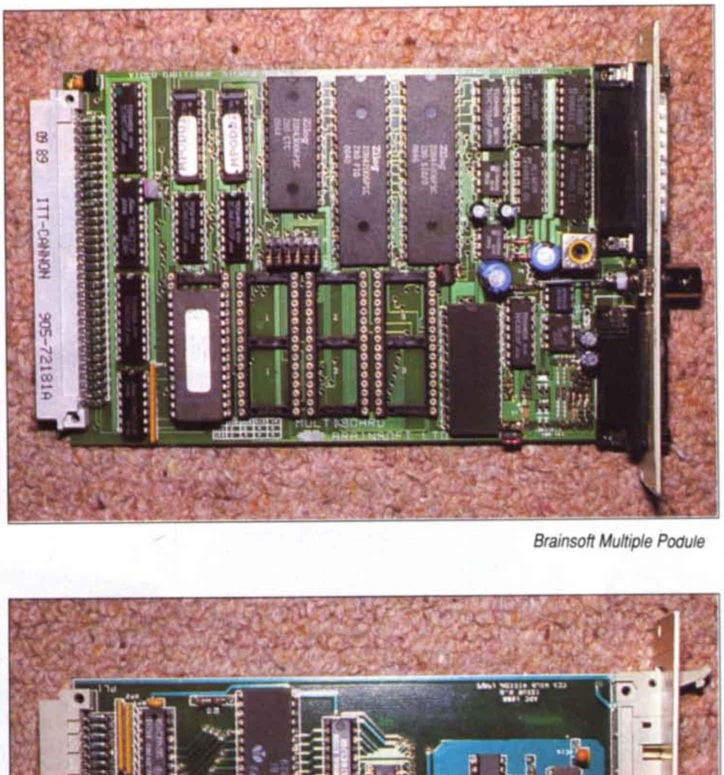
Send your entry to: Birthday Competition,
The Micro User, Europa House, Adlington
Park, Adlington, Macclesfield SK10 4NP.

Packing in the data

Ian Whitmore looks at new products which provide two methods of feeding information into your Archimedes



Brainsoft Multiple Podule

Wild Vision A-to-D Podule

Product: Multiple Input/Output Podule
Price: £117 + VAT
Supplier: Brainsoft Ltd, 106 Baker Street, London. W1M 1DF.
Tel: 0836 648551

AT the price, this has to be the best value hardware add-on available for the Archimedes. For about £130 you get a video digitiser, a sound sampler, a double RS232 serial port, an analogue joystick port and a four socket rom filing system, all on one podule.

The video digitiser can record pictures of almost as high quality as the other widely used one from Watford (see Figures I and II) but, unlike that, it cannot with any sense operate in real time. It takes about two seconds to capture an image, making it useful to digitise still pictures with a videocamera or still frames from a video recorder.

Although it supports picture capture in any graphics mode – including 20 – the Brain podule does not have all the fancy picture manipulation commands in the Watford system.

The sound digitiser accepts input from stereo sources, recording sound in memory. The length of sound sampled is dependent on the sampling speed and the memory available that has been selected in the next slot of the task master.

Sound samples are then displayed on screen – see Figure III – from where they can be played forwards or backwards at a range of speed and volume settings. You can zoom in on part of the sample, and delete or reverse it. These facilities allow for some manipulation of the sound and you can create some very odd effects.

Finally the sample can be saved to disc as it stands, or as a module for use by !Maestro and other sound packages.

The A-to-D converter which is common to both video and sound digitisers also supports 8 bit BBC Micro-type joysticks using a standard D type socket on the podule. Two twin axis joysticks with two fire buttons provide data via the ADVAL commands 0 to 4 or osbyte 128.

There's also a rom support system on the board, allowing three additional ones to be used, one socket being reserved for the podule manager. Sizes supported are 16k, 32k, 64k and 128k, including those in legal Acorn BBC B,B+ and Master formats, which will work under the 6502 emulators. It does not support palproms such as InterWord.

An RS232 D type socket provides a dual channel communications interface. The primary channel has RX, TX, RTS, CTS, DSR, DCD, DTR and RI lines supported while the secondary channel only has RX, TX, RTS, CTS and DCD lines. In addition a synchronous transmitter signal element timing line is available.

Risc OS software provides single channel comms with its own screen and access to baud rates, parity, echo and databit structure.

Software supplied on disc is mainly Risc OS-compatible, providing desktop icons for sound and video. Serial comms monopolises the machine but returns you to the desktop. However for the brave there are a set of star commands and several SYS commands.

The implementation of software and the documentation supplied suggests that the system is under continuous development, indeed I was sent an update of rom and disc software while writing this review.

Current versions seem to have solved many of the problems seen by other reviewers. The limitations in quality seen in all three analogue to digital conversions reflect the compromises necessary to implement all three in one podule with all its other functions.

All in all, I think Brainsoft has achieved a lot in getting all these functions on one podule, and in particular at the price. This makes it a good buy for the enthusiast, assuming the software continues to improve and upgrades are available.

Product: ADC 1208 Analogue to Digital Converter module
Price: £500 + VAT
Supplier: Wild Vision, 6 Jesmond Road, Newcastle upon Tyne. NE2 4PQ.
Tel: 091-281 8481

AT the other end of the scale is the ADC1208 A-to-D converter from Wild Vision. Famous for its video interface support for the whole range of Acorn micros, Wild has released a very high quality analogue to digital converter podule. It is capable of accepting analogue signals from eight channels at sample rates up to 160,000 samples/second with a 15 volt input range.

The podule, shown on the left, has two connectors. The first is a 15 pin D type providing eight analogue inputs with seven tied ground pins, while the second is pin compatible with the Acorn user port.

Via this port the podule can synchronise A-to-D conversions to external events, provide trigger outputs to control external events and allow external devices to select input channels and A-to-D conversion speeds. The conversion itself takes only six microseconds but as the board has a sample and hold circuit, the input analogue signal is only sampled for 10 nanoseconds. This results in a programmable sample rate variable between 30 and 160,000 samples/second.

The conversion is presented to the Archimedes as a 12 bit result, which means that it can resolve 2.44 millivolts in an input range of 15 volts. Wild even gives a formula in the manual so that you can work out exactly what binary output you will get for any analogue input.

A rom accommodated on the podule downloads a module into memory on startup. This provides 15 star commands and 13 SYS/SWI commands with associated help.

On a supplied disc are a few examples of simple programs to run the podule in Basic, C, Pascal and Assembler, while the manual provides further help for each of these languages.

I tested the podule using a variable frequency and output wave generator. The results at low and high frequencies were impressive, with the waveform shape being well maintained (see Figure IV). As you would expect, very high speeds are only available on a single channel and cannot be displayed on the screen in real time as the screen display is too slow to keep up. Thus high rate acquisition can be done as a background task.

The Wild Vision podule then falls into the other category, having only a single function, but doing it very well. As it is so expensive it has to be only for use by the professional in a scientific environment, where it will prove to be very valuable.

Summing up

You get what you pay for: If you're after a bargain the Brainsoft I/O podule represents excellent value for money as a good all-rounder. The Wild Vision podule is master-crafted and provides the precision required for scientific work.

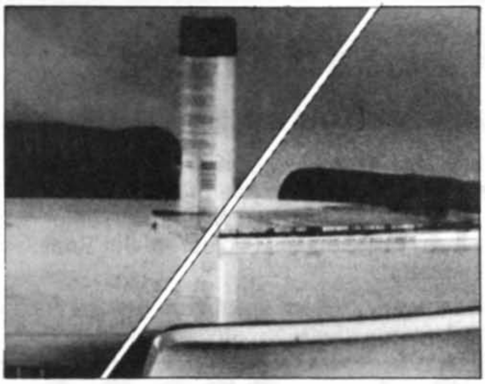


Figure I: Digitised picture from Brain Podule

Figure II: Digitised picture from Watford Podule

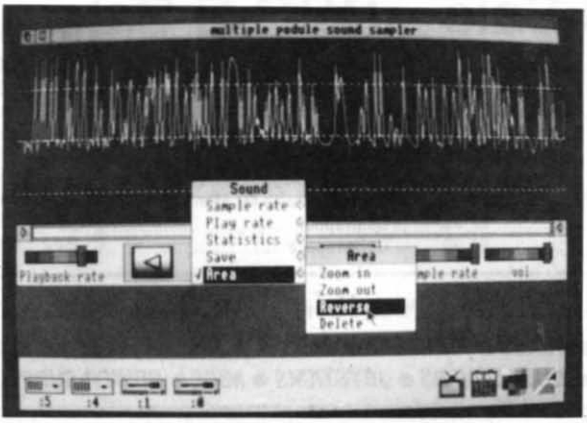


Figure III: Brain Sound sampler screen

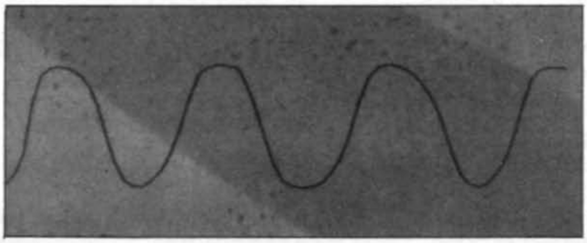


Figure IV: 10KHz sinewave digitised at 100KHz

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Fantastic voyage

The Mad Hatter dons his oilskins and sou'wester before joining Eric the Viking as he sails off for adventures new

WE left Eric on board his longship last month having gathered his companions and equipment necessary to start his adventures. Just before we set off I want to pass on some advice about the seascape in general and the maelstrom in particular:

A lovely word *maelstrom* – especially when pronounced with a Scandinavian accent.

It's entrance is near the shore and the fjord where you start – and it sucks you in and spews you out just North of a stone quay on the other side of the world. One antidote to the maelstrom is the huge plug found in the cold cellar under the giant bedroom – of which more anon.

The seascape is bounded by a mixture of mist – particularly on the Western edge – cliffs, farmland and jagged rocks, and even though I am supplying a solution to **Erik**, I do suggest that time spent exploring and mapping will pay dividends, since at some point in the game – as old hands will know – I am liable to leave out an important item.

I realise that some of you may think this a rotten thing to do, but I honestly can't see what fun can be derived from mindlessly following though a solution move by move to the very end. So I like to keep you guessing – apart from the fact that my aim in providing these solutions is to give you some teaching material on how to solve adventures for yourselves.

So off we go, and the location description we are starting from should show you at sea, with the shore to the East, more sea to the North and West and a fjord to the South. Moving W, W, W, W, W, W, S, S, S, S from here should bring you to some slimy rocks.

Now you must go E to the byre, search the haystack and take the needle before going E again into the stone room where you should examine the tools to find the sheep clippers and spade. Don't forget to investigate the loft.

Returning to the slimy rocks you move South once, then three times North and four times East to reach the deep fjord. It's time to go exploring.

West takes you ashore – take the driftwood – West again lands you in the forest and twice North should put you on the ledge with the dense forest to the South. Proceed North again to the rocky platform and then into the red room.

Here the Enchantress awaits you, promising untold delights if only you will do her bidding. Don't. Instead, take the chalice and throw it at her, before looking around to find the mirror which you should, naturally, take.

From the ledge, two moves South and two East will take you back to your ship The Golden Dragon, and from here you must travel S, E, N, E, N and N to the iceberg ledge.

That's where I'll leave you to shiver for now while you decide what items will be of use in your next foray ashore.

● *Continued next month*

Problem Corner

Philip Eglise has a problem or two in US Gold's Rebel Planet – a game I've mislaid my notes on. How can he pass the arguing Arcadians in the complex on Tropos? Also, what command is needed for him to board the pneuma tube in Halmuris, and finally, how can he get through hotel door 110 there?

Such sweet Revenge

I left you last month with hands full of treasure stranded in the pavilion in **Programmer's Revenge**, so what now follows is the routine needed to travel back to the trophy room in normal time.

Go S twice into the fifth time zone and E, N, W, W into the swamp, then S, W, S, E and N into the cave. Now go N four more times through the different zones until you emerge in the clearing.

Travelling W, W, W, SW, NW, NW and S will bring you back to the house. Go to the trophy room and drop the globe (12 points), fleece (13), pomegranete (14), tusk (15) and watch (21). Collect the horn and putty from the hall and return to the pavilion by the route described last month.

Moving S four times brings you into the fourth time zone. Now move E, NW and W into the jungle and then S, SE and SW to find the gigantic egg. Take it and go up, N, SE, SE and W back to the pavilion.

One move S will take you into the fifth time zone and if you attempt to go further back you will become a participating character in the Big Bang.

And although this is reminiscent of what eventually happened to A.E. van Vogt's character Robert Hedrock in the *Weaponshops* stories, it is not recommended here.

Instead, move E, N, W, W, S, SE and SW to find the nugget of Element-133. Take the element and continue up, NW and SW and take the gold tiepin.

If you now go S, E and then N five times you arrive at the clearing with full marks and the task of locating the Endgame.

A bit of translation is needed here, to make sense of the Inscription you noted in the desert – UBZNEPFOET XUB JISI. If you strip the vowels from the alphabet you get BCDFGHJKLMNPQRSTVWXYZ – moving the letters forward one position produces ZBCDFGHJKLMNPQRSTVWXY.

Only four vowels were used in the inscription – EIOU, and if they are swapped in pairs you get IEUO. You can now make the substitution to produce the message OZYMINDUIS WOZ HERE. In

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the Endgame. go W. S. W. and S back to the pavilion then S once into the first time zone. Move E. NW. NE to the castle picture and BLOW HORN. Now move S. W. S to the back door and KNOCK. This gets you into the dungeon.

To get out you need to THROW PUTTY so as to block the fountain and then you can go N and up – keep going up until you reach the door and then knock again. The answer is OZYMINDUIS – and *do* try not to make any typing errors.

My thanks to Sue Roseblade for fascinating insights into a marvellous adventure.'

Some time in the not too distant future we'll take a look at **Oxbridge** – and for that I have Colin Jack's own audit trail, map and comments, together with his kind permission to use them.

Hatter's Helpline

H. Jandu is puzzled about aspects of the adventure **Kayleth**. How does he open the Iris Door? He needs to collect five AZAP codes and then decipher their message. He should also try asking Yagmok for his key badge.

He's right in thinking that INSERT FUSE should work on the skimmer – I can't think why he's having trouble. Finally, spinning the rod will work wonders with the troublesome Zemps.

Peter Browning is having a few problems with the Level9/Mandarin epic **Lancelot** – an adventure he rightly describes as brilliant. He wonders how to negotiate the marsh in part one. He should try to recruit a knight to help him and see what blowing the horn does.

Peter hasn't quite worked out the business of the loose planks and secret panel either. The planks trigger a trap, so get someone to hold the panel open and then step on the planks.

Peter has also been told that a see-saw is involved here. Get someone to act as a counterbalance in the secret passage and all will be well.

May I remind readers that I can't supply random hints or tips for adventures, but will always do my best to answer specific problems like Peter's.

Riddle of the mystery ship

I have news for all **Elite** fans – hot from the pen of Commander Lee (Dangerous) Barrow. What he told me was so interesting that I am going to quote him verbatim:

*'I have an original version of **Elite** and have hit upon a small puzzle. I was jumping from Orarra on my way back to Errius. When I jumped, the star tunnel appeared once (normal), twice (Oh no, Witch Space, I thought) and three times. I found myself by a planet with very few stars.*

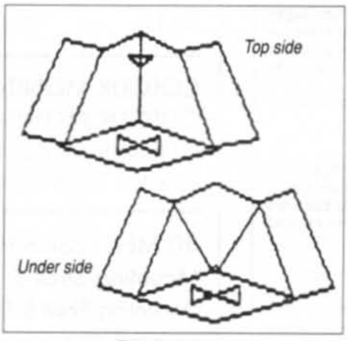
I tried looking at the local star chart, but there were very few systems – and none that I'd heard of. I approached the planet but got attacked by what seemed to be a fleet of Kraits. My attempts to outrun them failed (I always thought Cobra Mk IIIs were faster than Kraits) and so I detonated my energy bomb.

I returned to the planet only to find that there wasn't a space station. I orbited the planet several times and then discovered that I had been followed all the time by a strange cornet(ish)-shaped ship with weird things near its rear end.'

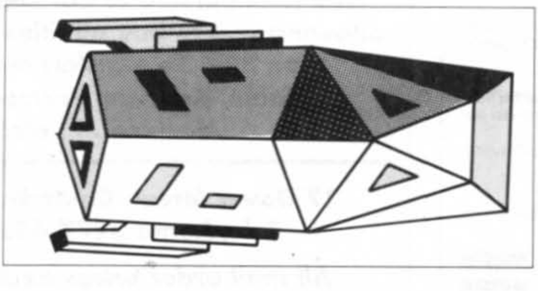
Lee wonders if *this* could be a space dredger. His illustration shows that it is not like drawings of the mystery ship that have been sent to me. It was impervious to missiles and his military laser, but he got it to explode by flying close to the sun.

When he tried to hyperspace to another planet in this system Lee found himself back in Galaxy 2 at Orarra – but minus his energy unit. Thanks for this fascinating information, Lee.

Scottish reader Stewart Montgomery sends a couple of timely reminders on how to tackle the first mission in Elite: Always save your status before approaching an Anarchy system, and try not to give the Constrictor time to replenish its shields when you are engaged in single combat.



The mystery ship



The Cornet-shaped ship

As a point of interest, many readers seem to have gained a fresh enthusiasm for Elite as a result of correspondence in this column. As an occasional change from adventures it certainly helps to pass the long dark evenings away once homework and other chores are over.

Alan Gibson writes to say that he is hunting space dredgers in Galaxy 7 on his Master Turbo version, but would like to know if it has sound volume controls in the same way that the ordinary Master one does.

He also points out that pressing Control+X while paused guarantees a jump into Witch Space. Final question from Alan: Has anyone come across the space graveyards mentioned in the manual? I've not.

Alistair McRonald asks for Elite cheats: I don't have any, but I am willing to help beginners by providing them with a docking computer and a few other goodies. Send me a formatted disc – state whether 40 or 80 tracks – and return postage – about 50p these days – and I'll gladly oblige.

Warning comes from Tim Ellis that the area round the planet Beorsora in Galaxy 7 is even more hostile than a normal Anarchy environment. So he accidentally blasts an innocent Cobra, finds Vipers in hot pursuit and then what pops up? Yes, our old friend the mystery ship. Well, it would, wouldn't it?

David Yarnall writes in puzzlement: *when I left the Reesdice system, my legal status was Fugitive, but on arrival in thr Arexe system it had changed to Offender. Does anyone know why?*

Yes David, I do: Making a hyperspace jump automatically reduces you from Fugitive to Offender unless you have destroyed an awful lot of Vipers – as I did once – when it takes a couple of hyperspace jumps.

The other way to erase a criminal past it to use the escape capsule.

R.J. Bevan is having screen display problems when he plays Elite. From the sound of it he should drop Mike Cook a line, or take his micro to a dealer who can carry out repairs.

The final thought for this month comes from Commander Chuck. He writes: *I have noticed that when carrying narcotics or firearms to an Anarchy system I sometimes get an escort.*

I'm surrounded by maybe half a dozen other ships and providing I don't attempt to shoot them they escort me to the planet. If I am carrying a bomb at the time I say "Thanks chaps", detonate it, and get that many more kills.

Chuck, you should go far.

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Logical choice

Mike Bibby explores an easy way to design digital circuits without recourse to soldering iron and a cat's cradle of wiring

HAVE you ever noticed how much difference there is between theory and practice? Well, nowhere has the theory/practice split caused me more angst than in the subject of digital electronics.

Sure, I know all about NAND and NOR gates: I can sketch out a schematic of an RS flip-flop with the best of them. And my circuit for an edge-triggered master-slave flip flop cannot be bettered.

It's just that the awfully messy business of wiring it all together defeats me...

For a start there's the problem of getting a power supply of the right voltage levels to the right places. And then there's the fact that, neat as the gates look diagramatically, in real life several of the creatures are crowded on to one chip.

And the inputs and outputs are all over the place, not neatly on opposite sides of the chip as they are in the pictures.

The result is that when I start to turn one of my schematics into reality the clear logic of my drawing degenerates into a confused tangle of wires. And making just a simple change in the flow of logic requires more rewiring than Blackpool illuminations after a hurricane.

Consequently I was delighted when I came across Digi-Sim from Musbury Consultants – developed by Mike Cook and Ian Hardwick. As the name implies, it allows you to simulate digital circuits.

However that's a bit like saying that the Archimedes is an upmarket calculator. Digi-Sim allows you to *wire* together logic gates, switches, LEDs and so on, then apply a signal and see how your circuit functions.

It's this ability to see the circuit actually working that makes Digi-Sim so good. In one sense it's a digital electronics design program – you build up a circuit by simply dragging component icons on to the screen and wiring them up.

Better than that though, Digi-Sim also simulates the action of a circuit by letting you apply voltage levels to the inputs of gates. The voltage output depends on the type of gate and the voltage input.

Of course this output might be one of the inputs to another gate, affecting that gate's output... and so on.

You can check the logic level of any input by wiring a LED up to it. If it lights you're at logic one, otherwise you're at zero.

One option, though, colours the interconnecting wires with the level they're carrying – blue for zero, red for one. At a glance you can see the logic flow through a practical circuit and see if it matches your theory.

Even better, if you make a change in the circuit – perhaps by substituting a different gate or altering a level with a switch – the resulting change in logic levels ripples through the gates.

It's a sort of digital logic spreadsheet – make a change in one of the values and the effects literally spread throughout the whole structure. In this case, of course, it's not boring columns of numbers that are changing, but logic levels, reflected in the colours of wires and LEDs.

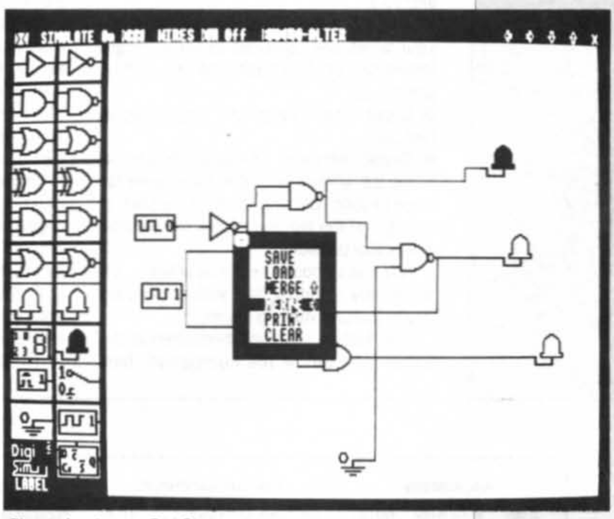
One nice feature is that the changes operate in real time – you can input a square wave and see the effect of the alternating levels propogate through the circuit. It's great for seeing how flipflops, divide-by-two counters and so on work. Add a sprinkling of LEDs and you've got your own mini illuminations.

The components available for your circuit are shown in icon form on the component bar to the left of an initially blank window. The icons are the standard digital logic symbols with inputs and output wires drawn as normal.

You get a fair selection of gates: AND, OR, NAND, NOR and EOR in both two and three input incarnations. And, of course, there's both inverting – NOT – and non-inverting buffers.

You also get red, yellow and green LEDs (ideal for your traffic light simulations) as well as a seven segment LED.

On the hardware side there's a toggle to earth switch as well as the normal single pole change-over switch. And you've also got an earth, which comes in useful. To round off there's a clock – one cycle per eight simulation passes – and an edge-triggered D-type flipflop.



Plenty of options on Digi-Sim's main menu

Putting your own circuit together is simple: You drag icons on to the circuit area window from the component bar keeping the lefthand mouse button depressed. Releasing the button places the component at that point on the circuit area, though you can drag it around again if you want to re-position it. Dragging it back to the component bar gets rid of it altogether.

Once you've got your components on screen you're ready to wire them up. Moving the pointer to the tip of an icon's input or output wire, and pressing the left button causes the pointer to change to a soldering iron.

Still holding the button down as you move this pointer across to the next input or output, it becomes a reel of wire which streches out behind it. Once you've reached your destination releasing the button completes your wiring. Very neat – unlike my normal soldering.

To get rid of wires you toggle one of the options on a top line selection bar from Build (its default) to Alter. Things work as with wiring-up, only now your pointer

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becomes a pair of wire cutters.

Digi-Sim only wires from output to input and vice versa. It won't let you wire two outputs together, though you can fan out from an output to several inputs.

Also you can't join two inputs directly, though you can join them up to the same output, which is just as good and probably more meaningful.

As well as the Build-Alter option, the top lines also has:

- **Simulate On-Off**. This toggles the display animation so you can build circuits without getting bothered by flashing lights and so on.
- **Wires On-Off**. This decides whether your wires are coloured to reflect logic levels or not. If it's off, the simulation speeds up.
- **Close Box**. The official way to leave Digi-Sim.
- **Scroll Arrows**. These allow you to move the window over the circuit area for large circuits. Clicking on an X symbol at the right of the top line returns the window to its initial position.

And that's about it for circuit building. It's extremely intuitive and within minutes you're building *working* cicuits.

One feature I haven't mentioned is the Label icon below the component bar. Dragging this on to the circuit area gives you a box for entering text. After pressing Return your label becomes a circuit icon and you can drag it to whichever position you want – a very useful option.

Pressing the centre button on the mouse gives you a menu that allows you to Save and Load files containing the current circuit. You can also Merge circuits in two ways, the new circuit appearing to the right of or above the current one.

There's also a Print option which calls printer dump or screen save routine you've installed – Musbury Consultants can supply one. The final option, Clear, gets rid of the current circuit.

All these options and techniques are clearly described in a superb manual written by Mike Cook. As well as the standard user notes, Mike has given us 10 chapters of an Introduction to Logic. It includes his well-known blend of humour, commonsense and crystal-clear explanations.

Gates, adders, Karnaugh maps, multiplexers, sequential logic, flip-flops, shift registers – they're all here. Not only that, but each chapter has four or more projects for you to work on.

In fact, the manual is as good as the program itself, which means it's very good indeed. Both are hard to fault.

The program was not written under Risc OS, so it doesn't support multi-tasking, and the window system is home grown. Some people will find this rather annoying as it prevents operations like using Digi-Sim alongside a word processor to make notes.

Summing up

If you're interested in learning digital electronics, or are involved in teaching the subject, Digi-Sim is a must. Even if you know it all already, you'll still find it a far more flexible and friendly design tool than a soldering iron.

I have only two minor niggles: At present there's no way of combining the elements of a circuit in one black box with only the inputs and outputs showing. As it is, large circuits can be untidy and unnecessarily complex.

I'd also like to be able to set the rate of the clock. At present it works as fast as the simulation. One way to slow things down is to drag extra, unconnected clocks on to the screen. While this is effective it's rather inelegant.

Having said that, the program and manual are superb and represent excellent value for money.

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You have a brilliant idea for an article, or a superbly documented micro utility? Then Alan McLachlan can offer some simple guidelines to help you get your prose into print

WRITING for a magazine can be fun and, providing you can get your work accepted, financially rewarding. You can improve your chances of reaping the rewards from that article or program by following certain guidelines. To help you present your submission in a format that will make it more acceptable, here are some guidelines.

First let's look at what you need to send and what you should do to ensure the whole package arrives safely. The adjoining panels suggest points that will need attention with particular reference to either written material or programs.

Most important is to label everything with the article's name and with your own name and address. This is vital as parcels can get split up even when they've reached their destination.

Text and programs must be submitted on disc or tape, with more than one copy in case one of the files fails to load. Documentation should be as a word processed file with double returns between paragraphs and no control codes. If you're sending more than one submission it's better to put each on a separate disc or tape.

Always send a covering letter giving details about yourself: Include your first name, age, occupation and telephone number — both home and work if possible.

Your submission may be rejected but if the editor knows, for example, that you are an expert in computer-aided design he may be in a position to contact you with a view to evaluating a specialist package on that subject.Supply a detailed description of everything you have sent in and if you want everything returned when it's finished with, please send a stamped-addressed envelope.

At the risk of stating the obvious, make sure you keep a backup copy of everything in case the original is lost or damaged. We know for a fact that the only copy of one budding programmer's efforts is floating around in limbo somewhere between his home in Birmingham and the editorial office.

Finally, and this is most important, on a separate sheet provide a declaration to the effect that:

- The submission is all your own work.
- It hasn't been sent elsewhere or if it has, it hasn't yet been accepted for publication.
- The editor has your permission to publish it.

If you follow these guidelines when you submit something to *The Micro User* you'll stand a much better chance of getting your work published. And just as important, you'll be on the way to becoming a more professional writer/programmer while doing so.

All magazines have their own house style – it's what makes them stand out from the rest. If you look at

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➤ articles published in the past you'll see that things are written in a particular way and you should try to follow that as much as possible.

Here are some considerations you should think about when submitting an article to *The Micro User*. They're not vital, but adopting the style at the original copy stage will mean less changes will be needed by the editors and sub-editors and your work is more likely to be accepted.

- Provide a complete description of any program including what it does, how to use it and outline the way it works, complete with details of its variables and subroutines. You could also give a few suggestions as to how it can be improved or expanded — even if you're not up to it, one of our talented readers may be.

- If it's a game, write an introductory plot to set the scene. You can be as inventive as you like.

- Watch out for repeated words or phrases in the same sentence — with a little care they can even be avoided in the same paragraph. If you are giving serious thought to professional writing on a regular basis, a thesaurus would be an invaluable investment.

- Unless absolutely necessary, long sentences and paragraphs should be avoided.

- In *The Micro User* abbreviations like *ie, eg,* or *etc* are never used. There are plenty of suitable alternatives — *such as, for example, and so on,* and *in other words* spring to mind.

- Use Roman numerals for referencing listings, figures and tables — Figure I and Table IV for example. Note that they always have captions and you are in a far better position to suggest these yourself.

- Use words for numbers zero to nine, but figures thereafter, unless two come close together as in *7 to 14-year-old children.*

- As you may gather from this list itself, you should avoid numbering items unless you need to identify them by number later.

- If you submit a game, let the editor know how to cheat so he can test out the higher levels. He's getting on a bit now and his reactions aren't what they use to be. If it's an adventure, a map of the various rooms and a complete solution are vital to assist in testing it to the full. With an arcade game too, include a map of the levels but also indicate the key moves necessary to make progress.

- With programs intended to run with a lot of data — a database for example — supply several sample files so your work can be evaluated more quickly.

Polishing up programs

Readers don't only type in listings for the fun of playing a game or adding a utility to their toolbox. Many also want to learn more about programming by doing so. It is vital therefore that your routines incorporate good programming practices, are well structured and economical on memory. Here are some other suggestions to point you in the right direction:

- It's not difficult to imagine how your program will appear on the page: Listings are reproduced in the magazine at a width of 40 characters with a space after the line number. Don't enter this space but use LISTO 1 and WIDTH 40 to see how your program will look. Watch out for lines which send just one or two characters round on to the next: Try removing unnecessary spaces. Always make use of multiple statement lines wherever possible, but start off your program with the following:

```
   10 REM Program name
   20 REM by Yours Truly
   30 REM (c) The Micro User
```

- Avoid procedure and variable names that may lead to confusion such as *l* and *O*, and use lower case where possible. Meaningful words also help such as *aliens* rather than *al*, but don't go overboard with exceptionally long names.

- Don't use blank lines to separate subroutines. They create the impression in readers' minds that something is missing.

- People will always make typing errors when entering listings, so don't disable messages with anything like ON ERROR RUN. Always use something like:

```
  40 ON ERROR MODE 7:PROCerror:END
2000 DEFPROCerror
2010 REPORT:PRINT" at line ";ERL
2020 ENDPROC
```

- If you're using Mode 7 don't include codes for things like colour as part of the string within the quotes. Always use CHR$(n) or VDU n in front of it.

- When nesting FOR...NEXT loops don't use NEXT,, as a short cut. Always include the correct number of NEXTs.

- If your game has lots of sound, provide an option to turn it off.

- Using PRINT "   " to produce spaces can cause untold problems when it comes to counting the number of characters between the quotation marks, particularly when a line splits between them. Always use SPC(x) or STRING$(x," ").

- Switch off the cursor and watch out for rogue question marks after INPUT statements.

- A few points on compatibility: If your program is designed to work on a BBC B, don't use EQUW, OSCLI or any other command specific to Basic II.

Where possible, try to make your routines suitable for the the whole range of BBC Micros — 8 and 32 bit. This means avoiding direct memory access except that which you've DIMmed within the program itself. Don't relocate programs on the Archimedes series: By using INKEY-256, any relocation routine can check to see which machine its being run on — this yields 160 or 161 on the Archimedes series.

Make sure your programs work at the intended speed whatever micro they're run on — use TIME based delay loops rather than FOR...NEXT ones.

- Instructions within the program are not always necessary, particularly if you've written an article to go with it. But if you do include them make sure they convey what you intended. And watch out for spelling mistakes and bad grammar — they'll make your program look amateurish. Try and make sure that words don't split at the ends of lines. It also helps to be able to get back to the instructions without having to re-run the program.

- When you've finished, make sure the program works correctly, especially after a last minute modification. Get your friends to test it out and note their comments.

- The last thing to do is to renumber the program from line 10 in increments of 10. That way any missing lines will stand out clearly.

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Life and the demons

Jim Paterson looks at some fascinating aspects of evolution displayed by your micro as it reflects in microcosm the gigantic forces which led from the chaotic birth of the universe to the relative stability we know today

FROM the scientific viewpoint, the beginning of the universe is peppered with a primordial soup of scattered atoms. Within this raw material, patches of crystalline matter begin to form – areas of order within chaos. These small facets consume the surrounding atoms as they grow.

Soon the crystals meet others of their own kind and a fierce competition develops. During this phase the crystals were involved in a battle for supremacy and into this world of competing growths mutant forms appeare spontaneously: Demons. Those strange creatures pull colour from surrounding crystals into a tight vortex and once started there is no stopping them, and they soon dominate the whole arena.

There is much competition even among demons as they spiral outwards jostling for space until eventually the entire universe is filled with a great combined demon pattern.

As you might guess, this universe can be best observed on a micro. It bears some resemblence to life in the way that order and stability arise out of randomness. Demons and life are both examples of what are known as cellular automata. These manifest themselves in regular arrays of cells each of which can be in one of a fixed number of states. Strict rules determine under what conditions the state of a cell will change.

Archimedes in action

On this month's 3.5in subscription disc is a stunning demonstration of the graphical power of the Archimedes series – a full machine code version of the Demons program processing up to 81920 pixels of a Mode 13 screen.

In Life only two states are allowed, occupied or empty, and the rules for generation are fairly complex. With demon patterns, cells can generally have several possible states – best represented by squares of colour on the screen. The rules which allow demons to grow are very simple: Each cell has four neighbours, and if any has a state one greater than the central one, then it changes to that state.

But zero is considered to be greater than the highest state in a cyclic fashion. The whole array changes from one generation to the next, with each cell either remaining the same colour, or changing to the next – provided it has a neighbour of that colour.

The program uses 16 colour Mode 2, and rather than using the flashing colours which would be rather distracting, it uses eight new mixed colours. This means that cells can be allowed to have up to 16 states. The array used can be up to a maximum size of 64 cells square. Edge effects are eliminated by allowing opposite sides of the screen to be considered as next to each other.

The program prompts you for the size of array and the maximum number of states to be used. It then proceeds to fill that array with cells with random states. At the right of the display are shown the two parameters you have entered and two additional figures. These are the generation number, that is how many times the complete screen has been examined and recalculated. The other figure shows the total number of cells which have changed state during the last generation.

This final figure is useful for checking on the progress of the patterns. For instance if the number of changes becomes zero then the pattern has reached a dead end and no cells can change state. More commonly, the figure might reach the total number of cells – for example 4096 on a 64x64 lattice. Every cell is changing state and this will continue indefinitely. Another possible final position is that the complete

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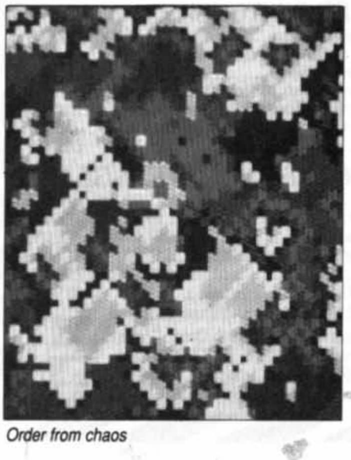
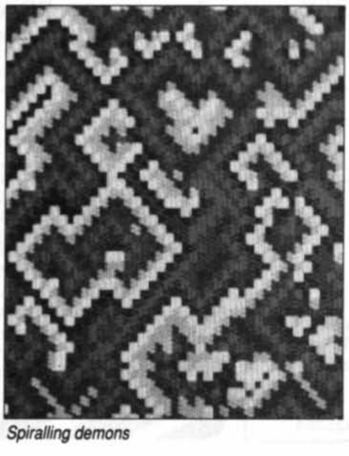


Order from chaos



Spiralling demons

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array passes through a repeating cycle of changes.

You can press Escape to halt the display at the end of the current refresh and pressing R resumes the process. Any other key will abandon the current screen and return you to the beginning, allowing the input of different parameters. Pressing Escape again will exit the program.

By experimenting you can discover which parameters produce the most pleasing patterns. As a rough guide less than six colours means that a steady state is reached very quickly and is therefore less interesting to watch. The more states you choose, the bigger the array should be in order to give it a chance of forming demons from the initial random position. Between 6 and 14 states is generally ideal with this program. With more than about 14, the probability of producing demons on an array size of 4096 cells becomes smaller.

The rules for creating demons were first explained in the August 1989 issue of *Scientific American*. In his influential Computer Recreations column, A.K. Dewdney attributes their discovery to David Griffeath.

There are a number of observations that you might make in exploring this world:

- Even in the final form there might be small imperfections in the array where some cells are touching others whose states differ by more than one.
- For a demon vortex to form, there must be a ring of cells with increasing state values. Once this has begun, there is no stopping it, as the ring is self-sustaining.
- Demon patterns are more likely to fill the whole screen when the number of states is even. An odd number most often results in a cyclic sequence of states. The reason is not exactly clear, but is probably to do with the fact that rings of cells must have an even number of cells.
- Finally, you might wonder what effects can be created by bending the rules a little. How many new cellular automata are out there waiting to be discovered? Let me know if you find any.

```
   10 REM "DEMON"
   20 REM by Jim Paterson
   30 REM (c) The Micro User
   40 PROCasm
   50 MODE2:*FX15,1
   60 INPUT"size (2-64)?"L
   70 IF L>64 OR L<1 GOTO 60
   80 ?len=L:PRINT'
   90 INPUT"states (2-16)?"M
  100 IF M>16 OR M<2 GOTO 90
  110 ?max=M:PRINT'
  120 CLS:VDU23,1,0;0;0;0;
  130
PRINTTAB(16,0)"size"TAB(16,1);L
  140
PRINTTAB(16,3)"stat"TAB(16,4);M
  150 PRINTTAB(16,10)"gens"
  160 PRINTTAB(16,13)"chgs"
  170 CALL init
  180 ONERROR GOTO 200
  190 CALL demon
  200 ON ERROR OFF:*FX15,1
  210 G$=GET$
  211 IF G$="R" OR G$="r" GOTO 180
  220 GOTO 50
  230 :
  240 DEFPROCasm
  250 DIM code 635,A 65,B 65,C 65,D
65
  260 row1=&70:row2=&72:row3=&74
  270 !row1=A:!row2=B:!row3=C
  280 scr0=&76:scr1=&78:scr2=&7A
  290 bot=&7C:len=&7E
  300 wk0=&7F:wk1=&80:wk2=&81
  310
cnt=&82:alt=&83:col=&84:max=&86
  320 gen1=&88:chg1=&8C
  330 FOR pass%=0 TO 2 STEP
2:P%=code
  340 [OPT pass%
  350 .demon LDA #ASC("0")
  360 STA chg1:STA chg1+1
  370 STA chg1+2:STA chg1+3
  380 LDA bot:STA scr1 \bottom
  390 LDA bot+1:STA scr1+1
  400 JSR moverow
  410 LDA #0:STA alt
  420 STA scr1:STA scr0:STA scr2
  430 LDA #1:STA cnt
  440 LDA #&30:STA scr1+1 \top
  450 STA scr0+1:STA scr2+1
  460 JSR moverow
  470 LDY len \save top
  480 .again LDA (row3),Y:STA D,Y
  490 DEY:BNE again
  500 .incrow JSR calcrow
  510 JSR moverow
  520 JSR recalc
  530 LDA scr0:STA scr2
  540 LDA scr0+1:STA scr2+1
  550 INC cnt:LDX cnt \each row
  560 CPX len:BNE incrow
  570 JSR cycle:LDY len \restore top
  580 .next LDA D,Y:STA (row3),Y
  590 DEY:BNE next
  600 JSR recalc \bottom
  610 LDX #3
  620 .gener CLC:LDA gen1,X:ADC #1
  630 CMP #58:BEQ car
  640 STA gen1,X:BNE print
  650 .car LDA #ASC("0"):STA gen1,X
  660 DEX:BPL gener
  670 .print LDA #31:JSR &FFEE
  680 LDA #16:JSR &FFEE
  690 LDA #11:JSR &FFEE:LDX #0
  700 .gen LDA gen1,X:JSR &FFEE
  710 INX:CPX #4:BNE gen
  720 LDA #31:JSR &FFEE
  730 LDA #16:JSR &FFEE
  740 LDA #14:JSR &FFEE:LDX #0
  750 .chg LDA chg1,X:JSR &FFEE
  760 INX:CPX #4:BNE chg
  770 LDA #&81:LDX #0:LDY #0
  780 JSR &FFF4:CPY #&1B:BEQ end
  790 JMP demon:.end RTS
  800 :
  810 .cycle \pointers
  820 LDA row1:STA wk1
  830 LDA row1+1:STA wk2
  840 LDA row2:STA row1
  850 LDA row2+1:STA row1+1
  860 LDA row3:STA row2
  870 LDA row3+1:STA row2+1
  880 LDA wk1:STA row3
  890 LDA wk2:STA row3+1:RTS
  900 :
  910 .moverow \from screen
  920 JSR cycle:LDY #0:STY wk2
  930 .nextcol LDY #0:LDA (scr1),Y
  940 LDX max \find colour
  950 .deccol DEX
  960 CMP t1,X:BNE deccol:TXA
  970 INC wk2:LDY wk2:STA (row3),Y
  980 CLC:LDA scr1:ADC #8
  990 STA scr1:BCC skip:INC scr1+1
 1000 .skip CPY len:BNE nextcol:RTS
 1010 :
 1020 .recalc \row2 to screen
 1030 LDY #1:LDA (row2),Y
 1040 LDY len:INY:STA (row2),Y
 1050 DEY:LDA (row2),Y
 1060 LDY #0:STA (row2),Y:INY:STY
col
 1070 .nextline LDA (row2),Y:CLC:ADC
#1
 1080 CMP max:BNE ok:LDA #0:.ok
 1090 CMP (row1),Y:BEQ equal \test
 1100 CMP (row3),Y:BEQ equal
\neighbors
 1110 INY:CMP (row2),Y:BEQ equal
 1120 DEY:DEY:CMP (row2),Y:BNE noset
 1130 .equal JSR putcell:LDX #3
 1140 .count CLC:LDA chg1,X:ADC #1
 1150 CMP #58:BEQ carry
 1160 STA chg1,X:BNE noset
 1170 .carry LDA #ASC("0"):STA
chg1,X
 1180 DEX:BPL count
 1190 .noset CLC:LDA scr2:ADC #8
 1200 STA scr2:BCC cont:INC scr2+1
 1210 .cont LDY col:CPY len:BEQ fine
 1220 INY:INC col:JMP nextline
 1230 .fine RTS
 1240 :
 1250 .putcell \to screen
 1260 TAX:LDA t2,X:STA wk0
 1270 LDA t1,X:TAX
 1280 LDY #0:STA (scr2),Y:INY
 1290 LDA wk0:STA (scr2),Y:INY
 1300 TXA:STA (scr2),Y:INY
 1310 LDA wk0:STA (scr2),Y:RTS
 1320 :
 1330 .calcrow \next screen row
 1340 LDA alt:BNE bigadd:LDA #1:STA
alt
 1350 CLC:LDA scr0:ADC #4
 1360 STA scr0:STA scr1
 1370 LDA scr0+1:STA scr1+1:BNE
endadd
 1380 .bigadd LDA #0:STA alt
 1390 CLC:LDA scr0:ADC #&7C
 1400 STA scr0:STA scr1
 1410 LDA scr0+1:ADC #2
 1420 STA scr0+1:STA scr1+1:.endadd
RTS
 1430 :
 1450 .init \mix colours + random
fill
 1451 LDX #31:LDY #30:LDA t1,X:STA
wk1
 1470 .cycol LDA t1,Y:STA t1,X:DEX
 1480 DEY:BPL cycol:LDA wk1:STA t1
 1490 JSR rnd:AND #7:BNE init
 1510 LDA #&30:STA scr1+1:STA scr0+1
 1520 LDY #0:STY scr1:STY scr0
```

All program listings in this issue can be downloaded FREE on . . .

MicroLink

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```
 1530 LDX #0:STX alt:ST-X cnt
 1540 .initrow STY col
 1550 .reprow JSR rnd:AND #15
 1560 CMP max:BPL reprow
 1570 LDY scr1:STY scr2
 1580 LDY scr1+1:STY scr2+1
 1590 JSR putcell:CLC:LDA scr1:ADC
#8
 1600 STA scr1:BCC over:INC scr1+1
 1610 .over INC col:LDY col
 1620 CPY len:BNE reprow:INC cnt
 1621 LDX cnt:CPX len:BEQ endinit
 1650 JSR calcrow;LDY #0:BEQ
initrow
 1660 .endinit LDA scr0:STA bot
 1670 LDA scr0+1:STA bot+1
 1680 LDA #ASC("0"):STA gen1:STA
gen1+1
 1700 STA gen1+2:STA gen1+3:RTS
 1720 :
 1730 .rnd LDY #32:.rnd2 LDA &0F
 1740 LSR A:LSR A:LSR A:EOR &11:ROR
A
 1750 ROL &0D:ROL &0E:ROL &0F:ROL
&10
 1760 ROL &11:DEY:BNE rnd2:RTS
 1770 .t1:]:t2=t1+16
 1780 P%!0=&24301000:P%!4=&3D3C1C0C
 1790
P%!8=&0B0F2F3F:P%!12=&22331303
 1800
P%!16=&18302000:P%!20=&3E3C2C0C
 1810
P%!24=&070F1F3F:P%!28=&11332303
 1820 NEXT:ENDPROC
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 3E7F F
  50 = CDC5 5
  60 = 209F 5
  70 = 6F36 2
  80 = 9F74 3
  90 = 34BE 4
 100 = B992 C
 110 = F8B0 4
 120 = F9FD 2
 130 = 462F 7
 140 = 54C5 3
 150 =  2B1 2
 160 = E4D5 D
 170 = 848F D
 180 = 4010 2
 190 = EF48 8
 200 = B43E A
 210 = 506B 5
 211 = BC45 4
 220 = 80C2 1
 230 = 9719 7
 240 = 28E7 1
 250 = 645D B
 260 = 8CD4 7
 270 = FB32 D
 280 = 3EE1 0
 290 = 3E25 2
 300 = EE69 E
 310 =  E5D E
 320 = 8753 0
 330 = 6D4E 0
 340 = 95CD 4
 350 = 23D7 7

 360 = D303 0
 370 = AF4A A
 380 =  7B5 B
 390 =  CE5 2
 400 = F510 F
 410 = A97B 2
 420 = ADF0 4
 430 = 4A5A 1
 440 = 6387 5
 450 = 6532 9
 460 = F510 C
 470 = A1B3 5
 480 =  A93 F
 490 = 9526 9
 500 = E610 D
 510 = F510 A
 520 = 650C B
 530 = 7056 8
 540 = 465A D
 550 = 2BEA 7
 560 = 87B5 1
 570 = 537E 1
 580 = 7622 6
 590 = 4610 5
 600 = 1461 0
 610 = DA26 8
 620 = 2369 1
 630 = A208 5
 640 = 3DC9 D
 650 = 38D6 0
 660 = 5F0A D
 670 = 55F7 0
 680 = E3B0 E
 690 = 8B9E D
 700 = 245C 3
 710 = D388 2

 720 = CCE7 1
 730 = E3B0 C
 740 = 8B08 C
 750 = 30C5 E
 760 = E83D 6
 770 = A814 1
 780 = 1076 0
 790 = 7DFC C
 800 = 9719 6
 810 = 84C5 3
 820 = 5923 F
 830 = BD9F 5
 840 = B88E E
 850 = 2FFD 1
 860 = E7A8 6
 870 =  DCC 8
 880 = 30EB 0
 890 = 9C26 D
 900 = 9719 F
 910 = 69B9 B
 920 = CB9C 2
 930 = A287 5
 940 = E7B2 5
 950 = 6995 A
 960 = 91D0 9
 970 = 43C5 2
 980 = DA72 5
 990 = 3B58 0
1000 = A511 B
1010 = 9719 6
1020 = 519B 4
1030 = 1553 A
1040 = 36EA B
1050 = 804A 5

1060 = 33A7 B
1070 = F253 0
1080 = 5B5F C
1090 =  91A C
1100 = 44C3 B
1110 = 435C 9
1120 = 1E98 5
1130 = EB6A 0
1140 =    1 1
1150 = 7B91 6
1160 = 8E91 5
1170 = DA2D 6
1180 = B109 A
1190 = 300F 4
1200 = 78C0 E
1210 = A427 6
1220 = CED6 8
1230 =  B13 7
1240 = 9719 E
1250 = 4CCA 5
1260 = 3CE4 9
1270 = 3038 4
1280 = 2E4D 0
1290 = 145A 6
1300 = 27F4 C
1310 = EA3A E
1320 = 9719 D
1330 = 9423 4
1340 = 421A 5
1350 = 5C2D 1
1360 = 8880 2
1370 = F9CA B
1380 = 1A91 2
1390 = 77BB 8
1400 = 8880 1
1410 = 8E47 A

1420 = 51D7 3
1430 = 9719 0
1450 = 1A86 1
1451 = E6FA 3
1470 = 8F60 3
1480 = 7419 1
1490 = F492 F
1510 = 511B 2
1520 = 2124 1
1530 = CCA6 B
1540 = 92AD 3
1550 = E996 C
1560 = D2CB 2
1570 = 611A C
1580 = BE36 C
1590 =  26E D
1600 = 6A60 E
1610 = 99C1 2
1620 =  78C 8
1621 = 6C2D 6
1650 = 998C A
1660 = 660F F
1670 = 73EC 5
1680 = 457A B
1700 = E5A6 B
1720 = 9719 5
1730 = AD41 E
1740 = AABF 7
1750 = AF8A 9
1760 =  63B 8
1770 = F4AB F
1780 = 8C2C 4
1790 = 6D76 C
1800 = A225 3
1810 = D38A 2
1820 = E531 6
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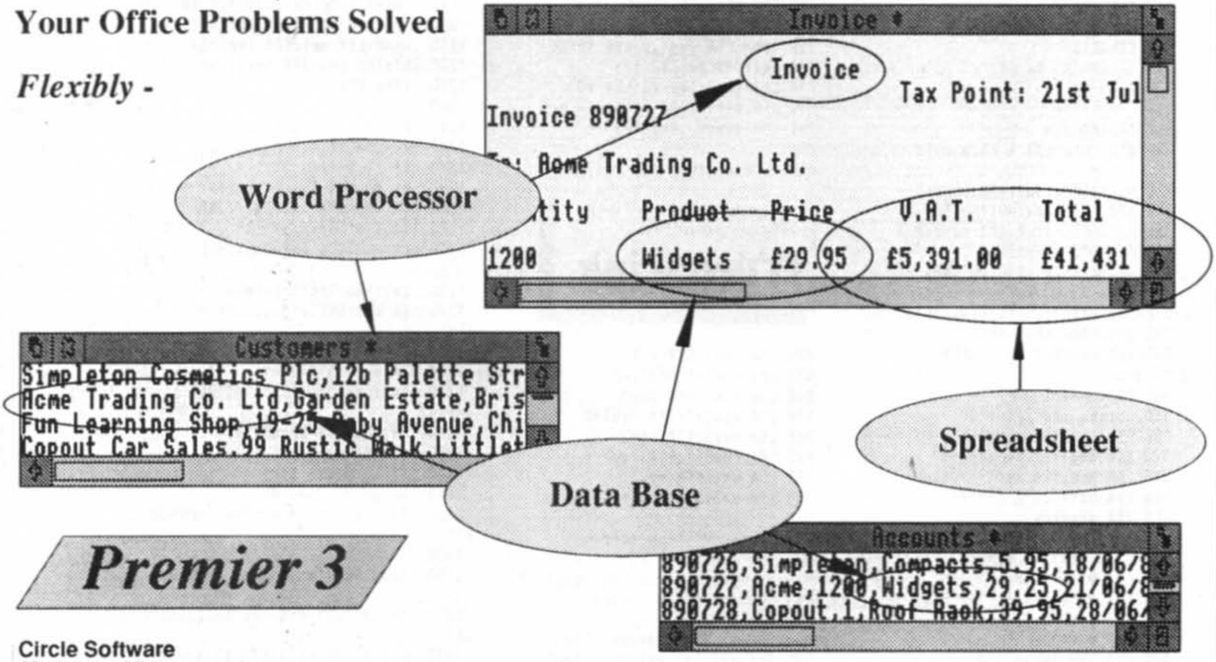

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Invoice 890727
To: Acme Trading Co. Ltd.
Tax Point: 21st Jul
ntity Product Price V.A.T. Total
1200 Widgets £29.95 £5,391.00 £41,431

Simpleton Cosmetics Plc,12b Palette Str
Acme Trading Co. Ltd,Garden Estate,Bris
Fun Learning Shop,19-25 Abby Avenue,Chi
Copout Car Sales,99 Rustic Walk,Littlet

890726,Simpleton,Compacts,5.95,18/06/8
890727,Acme,1200,Widgets,29.25,21/06/8
890728,Copout,1,Roof Rack,39.95,28/06/

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Archimedes micro

System	Basic	Mono	Colour	Multiscan
310	£899	£959	£979	£1294
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420/1	£1699	£1759	£1878	£2094
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.(Securicor carr. £10 on Archimedes)

A3000 – A RISC worth taking

● A3000 Archimedes Microcomputer	£649

● 3.5" External Drive	£85	● Dust Cover Micro only	£4
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Unbeatable WINTER SALE

Offers on Archimedes Micro

When you purchase an Archimedes Micro from Watford, look what you get FREE with it

Micro	Free Offer
A310	A Real Time Video Digitiser worth £249
A410/1	Upgraded to 2MB RAM & a 20MB Hard Disc, worth £299 (A420)
A420/1	Upgraded to 4MB RAM & a 40MB Hard Disc, worth £679 (A440)
A440/1	A TAXAN 770+ 14" Multisync Monitor
A3000	Upgraded to 2MB, worth £159

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0% FINANCE

We are once again able to offer 0% finance for the purchase of an Archimedes or BBC Master micros and some peripherals. For further details please write in or telephone:
0923 37774 ext. 223, 203 or 201

FREE On-Site Maintenance

This month we are also offering at no extra cost to all our customers, 12 months, On-Site Maintenance on all Archimedes Micros, BBC Masters, Philips, Microvitec, and Multiscan COLOUR Monitors. Also on the full range of Panasonic Printers.

Should your machine fail, simply telephone the maintenance engineer, who will call in within 12 working hours to repair the unit.

(P.S. This offer is over and above our Unbeatable Winter Sale Offers on Archimedes Micros).

(Offer applicable only when bought at prices advertised in this advert).

Archimedes Special Upgrades

The impossible is now possible. Watford's Ram booster system adds more Ram to your Archimedes. Upto 2 and 4 Megabytes for A3000 and 2 & 4 Megabyte kits for the A300 & 400* series.

(* For A400 series we also supply low cost Hard Disc upgrades too.)

Convert your Archi 410 to a 420 or 440 with Watford's unique Upgrade Kits

UP10 – 1MB RAM + 20MB Hard Disc	£275
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UP30 – 3MB RAM + 40MB Hard Disc	£569
UP40 – 3MB RAM + 53MB Hard Disc	£669

(P.S. When purchased with an A410/1, the upgrades will be fitted at no extra cost)

Archimedes RAM Upgrade

All our memory upgrades are simple to fit. No soldering required.

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● A3000 Watford 4MB RAM Upgrade	£349
● A305 0.5 Meg RAM Upgrade	£99
● A305/310 2Meg RAM Upgrade	£285
● A305/310 4Meg RAM Upgrade	£499
● A410/1 RAM Upgrade to 2 MB	£109
● A410/1 RAM Upgrade to 4 MB	£319

(Carriage on Add-ons £3)

Watford's 20Meg & 40Meg Archimedes Hard Disc

Watford Electronics' 20Meg & 40Meg hard disc fits internally into the Winchester slot provided.

It is fully compatible with Acorn's hard disc upgrade, (the only difference is our low price). Price includes the Hard Disc Drive, Controller Podule & fitting instructions.

P.S. The 310 upgrade requires a backplane and a fan.

● 3HDP – Hard Disc Podule only	£175
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● 3HD40 – 40Meg H' Disc + Podule for 310	£439
● 2 Podule backplane (Watford)	£25
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● Fan for the backplane	£8
● 4HD20 – 20 Meg Hard Disc for 410	£169
● 4HD40 – 40 Meg Hard Disc for 410	£285
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(Carriage £7)

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Acorn's Archi DTP Package	**£125**
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(P&P on above £2)

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Super Plot	£22	Solids Render	£59

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Solid Tools	£199

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Assembler; LISP or Prolog X	£155 **each**
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ROBO LOGO	£56	TWIN EDITOR	£25
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(P&P £2 on above packages)

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** Requires System Delta*
(P&P on above items £2)

Archimedes to BBC Serial Link Mk 2

Using this simple data link, it is possible to solve all your BBC to Archimedes data transfer problems. The kit is supplied with a disk, and the necessary cable to connect the two computers.

New RISC OS Version **Only £15**

Archimedes 5.25"/3.5" Disc drive Interface

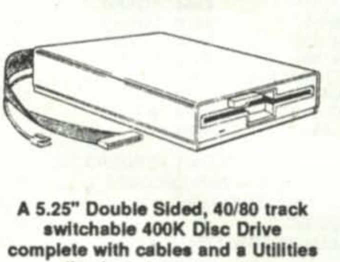
With this interface it is possible to connect almost any 5.25"/3.5" disc drive with its own power supply to the Archimedes. Upto 4 disc drives can be connected. NO SOLDERING is involved. Supplied complete with necessary lead.

Only £21

BBC MASTER

MASTER 128K Micro incl. Acorn's View, Viewsheet, ADFS, BASIC Editor & TERMINAL plus FREE OFFER (see below) **£439** *(carr £7)*

FREE OFFER



A 5.25" Double Sided, 40/80 track switchable 400K Disc Drive complete with cables and a Utilities disc incl. 2 games, plus

Gemini's OFFICE MATE & OFFICE MASTER packages on Disc consisting of: Database, Spreadsheet, Beebplot graphics. Accounts packs: Cashbook, Final Accounts, Mailist, Easyledger, Invoice & Statements, Stock Control.
FREE with every BBC Master purchased from us during February

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ECONET Upgrade Kit for BBC B	£42
ALL ECONET UPGRADES Available	
ARIES' IEEE Interface for BBC B & Master	£238
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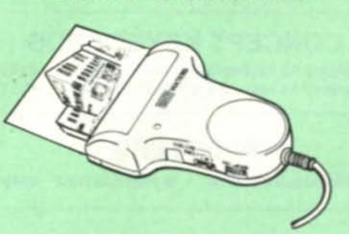
Filestore E40s	£799
Filestore E60S	£1080
Ecolink	£270

(Carr. £2 to £7 depending on the weight)

Archi Mk II Hand Scanner



Watford Electronics is now able to offer a complete hand held scanning package, possibly the most essential addition to any desk top publishing system. The package includes the most comprehensive utility software available for the Archimedes, a high quality, ergonomically designed to fit the shape of your hand, (see drawing above) scanner, which is fitted with a warning LED that will indicate if the scanner is being moved too quickly for accurate results. Additional twin guide rollers ensure precise tracking over the image, to make the best use of the high resolution available with this sytem. The yellow/amber illumination of our Mk II scanner, enables you to achieve optimum accuracy. It is capable of scanning upto an amazing 400 DPI. The scanning area is 4" wide and the height is only limited by the maximu amount of memory available.

On board ROM software supplied, is the most sophisticated Archimedes scanner software yet written.

Launch offer £149 (P&P £4)
(Please write in for technical details)

Z88 Portable Micro

Watford Electronics are the largest Z88 Dealer in the UK

Only: **£195** (Carr £4)

FREE

With every Z88 purchased from us this month, we are giving away absolutely FREE, a Z88 to BBC Interface Link, 4 rechargeable batteries and a compact Mains Battery Charger worth £38.

ACCESSORIES

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128K RAM Pack or 128K ROM Pack	£45
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Z88 Serial Printer Cable	£9
Z88 Parallel Printer Cable	£25
● Z88 to BBC Link	£20
● Z88 to PC Link II	£30
● Z88 to Macintosh	£52
● Z88 Mains Adaptor	£9
● Z BASE	£56
● Z TAPE	£42
● Z TERM	£42
● Z88 Modem	£149
● Z88 to Archimedes Link	£TBA

By popular demand, we are now supplying refurbished and fully guaranteed BBC Micros with Disc Filing System
(Please telephone for price & availability)

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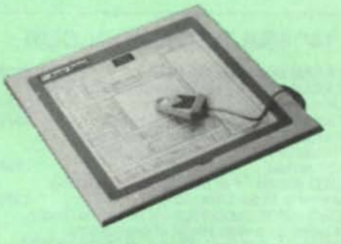
In these days of expensive borrowing, we are pleased to have negotiated a special low rate finance deal for our customers, with flat interest rate of 12.25% per annum, typical APR 25.5%.

In addition to the above, we are able to offer all Archimedes and BBC Master computers as well as selected hardware on a 0% interest free finance deal.

For further details please telephone: 0923 37774 ext 223/203/201.

Archi Graphic Tablet



This package allows Archimedes users to take advantage of the low cost graphpad (sometimes called a digitiser tablet, but not to be confused with a video digitiser!)

The Archi Graphpad offers performance and accuracy comparable to other graphics tablets priced at well over £400, and has the useful addition of a liftable cover, which can hold tracing material or menu templates securely.

The software, which is in the form of a relocatable module (RM), intercepts the system calls which control the mouse, and so allows virtually all mouse based Archimedes software to be controlled using the tablet without any modification. The only exceptions are programs which use the serial port, as the tablet is physically connected to this port itself.

Graphics programs such as Artisan, Pro Artisan, AutoSketch, Oak DTP, and the RiscOS Draw, Paint and DTP packages are considerably enhanced by the use of the graphics table as opposed to the mouse, although it can, of course, be used with any other mouse driven application.

The software allows the user to define how much of the tabler's 12" x 12" working area to use, allowing very fine control when drawing freehand or tracing from a variety of differently sized drawings, diagrams, photographs, etc.

The tablet driver is compatible with all Archimedes machines, and with both Arthur and RiscOS operating systems.

The pointer is moved via a four button puck complete with transparent lens and crosshairs for optimum accuracy. Three of the buttons emulate the Archimedes mouse buttons precisely, the fourth being used for special functions such as setting the position and size of the active working area. The buttons may be remapped to allow the relationship between tablet and mouse buttons to be redefined, should this be required.

The software is supplied with a special adaptor lead to connect the tablet to the Archimedes' serial port, and a power lead which plugs onto the Archimedes' main board.

Special Price £249 (carr. £4)
(Price includes Tablet, Leads & Software)
Stylus Optional Extra **£29**

Continued→ → → → → → → → →

MONITORS

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● **EIZO** 8060H – For technical info. read the review in Micro User, Jan. '89	£389
● **EIZO** 9060S Super High resolution multiscan monitor for a wide range of applications. 800 dots x 600 lines. Display for high res VGA. 0.28 Dot pitch	£469

TAXAN 12"

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● **BM7502** 12" Hi-res Green Monitor	£64
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● **PHILIPS 14"** Medium Res, dark glass, attractively finished Colour Monitor – supplied complete with RGB, SKART and Audio/Phono Inputs. A push-button switch toggles between Hi-Res monochrome green text mode and full colour display. (Please state the type of Connecting Lead you require).

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Dust Cover for Philips Monitors £6

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By simply placing your monitor on one of our front adjustable professional swivel bases (see drawing at the top), you can easily adjust the monitor viewing angle.

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Anti Glare VDU Screen

These extremely effective, easy to install, 12" & 14" VDU screens eliminate harmful glare, improves contrast on colour monitors. Increases productivity in offices. A must for wordprocessor users.

Price £12

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BNC Lead for Zenith or Philips	£3
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Standard A3 Keyboard with BBC Software	£143
Standard A4 Keyboard with BBC Software	£117

PLOTTERS

● Plotmate A4S	£379	● Plotmate A3M	£549

Roland Plotters

(Official Roland Appointed Distributor)

● **DXY 880A**	£499	● **DXY 1100**	£615
● **DXY 1200**	£835	● **DXY 1300**	£1015

12 months FREE maintenance on site

Panasonic KX-P1081

SALE OFFER only: **£127**

(Price includes, FREE a 4ft Printer Lead, and a Dump Out 3, Screen Dump ROM worth £35 with every printer purchased from us)

KX-P1180 Printer Offer

Panasonic KX-P1180 printer, Dump Out 3, Screen Dump ROM & a BBC printer lead.

Offer Price £136

Panasonic Printers

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● **KX-P1180** 9pin 80col. 144/38 CPS	£146
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● **KX-P1592** 9pin 136col. 216/45 CPS	£275
● **KX-P1595** 9pin 136col. 288/61 CPS	£355

● **Panasonic KX-P4450i** LASER PRINTER Latest technology at Watford's special offer price £1,325

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● Drum Unit	£149	● Developer	£115
● 1MB RAM Board			£299

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KX-P1592/1595 (P32)	£175	KX-P1540 (P35)	£175
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P12	4K buffer Board for 1081	£55
P42	32K buffer Chip for 1592/1595	£16
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P17 P1081/1592	£32	P19 P1124/1180	£55

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Guaranteed to last 3 million characters

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Pinwriter Serial Interface (optional)	£55
P2200 Cut Sheet Feeder	£59
Additional Font Cartridge	£25

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NEC P6+ 80 columns	£439	**NEC P7+** 136 columns	£575
Colour Option	£74	Serial Interface	£73
Cut Sheet Feeder	£125		
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Hewlett-Packard Printers

HP Quiet Jet Plus	£425
HP Desk Jet Plus	£525
HP Paint Jet Colour	£649
HP LaserJet Series IIP	£825
HP LaserJet Series II	£1275

12 months FREE maintenance on site

Star Printers

Star LC10	£139	LC10 Colour	£195
Star LC24-10	£215	XB24-10 Colour	£410
NB24-10	£410	XB-10 Colour Kit	£24
LC10 Colour Ribbon	£5	Cut Sheet Feeder	£55

EPSON PRINTERS

EX800	£419	LQ860 Colour	£529
EX1000	£564	LQ1050	£575
FX850	£319	LQ1060	£655
FX1050	£415	LQ2550+	£915
FX1060	£679	LX400	£135
GQ3500 Laser	£999	LX850	£195
LQ400	£205	SQ850	£525
LQ850	£405	SQ2500	£899
LQ550	£259		

CUT SHEET FEEDERS for

EX800/FX800/850/LQ800/850	£130
FX1000/LQ1000/1050	£175
LQ2550	£390
LX400/800/850/LQ400/500/550	£69

TRACTOR FEED for

LQ800 **£44**; LQ850/FX850 **£69**; LQ1050/FX1050 **£85**; LQ2500 **£90**; LQ2550 **£90.**

ACCESSORIES

● EX800/1000 Colour Option	£55
● EX800/1000 Colour Ribbon	£14
● LQ2500 Colour Option	£65

(Securicor Carriage on Printers £7)

EPSON PRINTER INTERFACES

All these interfaces fit inside the printer

RS232	£32	RS232 + 2K Buffer	£52
IEEE 488	£40	RS232 + 8K Buffer	£79

PRINTER LEADS

BBC Centronics 4' long	£5
BBC Centronics 6' extra long	£7
Compact's Special Centronics Lead	£7
Archimedes Printer Lead 1 metre	£6
Nimbus Centronics Lead	£6
IBM Parallel Lead 1 metre	£6
Double Ended 36 way Centronics Lead 4'	£7
Double Ended 36 way Centronics Lead 6'	£9
MSX Centronics Parallel Lead 4'	£12
RS232 Leads (Various)	P.O.A.

Listing Paper (Perforated)

● 1,000 Sheets 9.5" x 11" Fanfold Paper	£7
● 2,000 Sheets 9.5" x 11" Fanfold Paper	£11
● 1,000 Sheets 9.5" x 11" NCR 2 Part Fanfold	£19
● 1,000 Sheets 15" x 11" Fanfold Paper	£9
● 1,000 Sheets true A4 Fanfold Paper 70gms	£11
● 2,000 Sheets true A4 Fanfold Paper 70gms	£19
● Teleprinter Roll (Econo paper)	£4

(All our Fanfold paper is Micro perforated leaving a smooth clean edge when the tractor feed strips are detached).

Carriage 1K Sheets £2.50, 2K Sheets £3.00

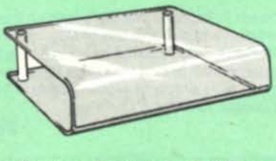
PRINTER LABELS

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£5.00
1,000 90 x 36mm (Twin Row)	£4.90
1,000 90 x 49mm (Twin Row)	£7.50
1,000 102 x 36mm (Twin Row)	£6.25

Carriage on 1,000 Labels £1.00

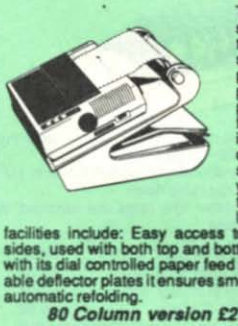
Perspex Printer Stand



Give you Computer System a touch of Class with our elegant, smoke finished Perspex Printer stand.

80 Column version	**£16** (carr £3)
136 Column version	**£20** (carr £4)

Professional Printer Stand



This new professional printer stand takes hardly more space than your printer. Due to the positioning of the paper feed and refold compartments ie. one above the other, the desk space required for your printer functions is effectively halved. Additional facilities include: Easy access to paper from both sides, used with both top and bottom feed paper and with its dial controlled paper feed system with adjustable deflector plates it ensures smooth paper flow and automatic refolding.

80 Column version £23 (carr. £3)

132 Column version £26 (carr. £4)

Printer Ribbons & Various Dust Covers

Type	**Ribbons**	**Dust Covers**
Brother HR15/20	**£3.00**	**–**
BBC Micro	**–**	**£3.50**
BBC Master	**–**	**£4.00**
Archimedes Micro pair	**–**	**£9.00**
Citizen 120D	**£3.95**	**£4.50**
RX/FX80/MX80	**£3.00**	**–**
DMP2000	**£3.75**	**£4.75**
EX/LQ800	**£4.50**	**£4.50**
EX/LQ1000	**£6.75**	**£5.00**
RX/FX80/85/800/MX80	**£3.25**	**–**
RX/FX100/1000	**£5.00**	**–**
Kaga/Taxan KP810/815	**£4.90**	**£5.00**
LC10 (Black)	**£4.25**	**£5.00**
LQ500/800	**£3.75**	**£5.00**
LQ1050/LQ2500	**£7.00**	**£5.50**
LX80/86/800/850	**£3.25**	**£4.50**
M1009/GLP	**£3.80**	**£3.75**
NEC P2200	**£6.00**	**£5.00**
Panasonic KX1080/81	**£3.50**	**£4.75**
Panasonic KX-1124	**£8.00**	**£5.00**
SQ2500	**£23.00**	**£5.50**
Star NL10	**£3.75**	**£4.50**
Olivetti Ink Jet Cartridges (set of 4)	**£9**	

Our attractive Dust Covers are manufactured from translucent PCV. The seams are stitched and edges are taped to prevent splitting due to continuous use.

Universal Printer Sharers/Changer

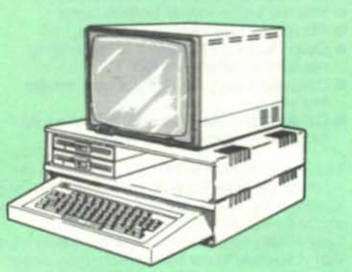
Connect upto 5 Micros to 1 printer or 5 Printers to 1 Micro with our combined, Sharer/Changer. These Units are made to a very high standard. For extreme reliability, they all have Printed Circuit Boards mounted inside the case, (not a Spaghetti Junction of wires). Internal connection is made via high quality ribbon cables.

(Ideal for School environments)

Connects	**Serial**	**Centronics**	**P&P**
2 to 1	£20	£22	£3
3 to 1	£27	£30	£3
5 to 1	£36	£39	£4

(Cables extra at £6 each. Please specify type required when ordering)

PLINTHS FOR BBC MICRO, MASTER & PRINTERS



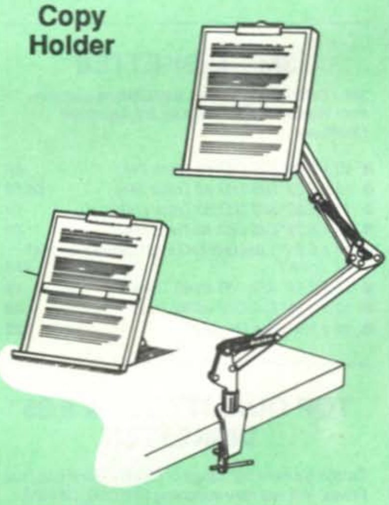
Protect your computer from the heat of your VDU. Our micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and VDU, whilst the double height version provides enough room for our stacked disc drive and other peripherals like, Eprom programmer, music unit or simply discs & stationary. The computer slides neatly in the lower section allowing easy access to remove the lid.

The single printer stand is equally sturdy but instead of cooling slots it has elegant cutouts on the sides. This allows easy access to paper from all sides. Colour: BBC Beige.

Single BBC Plinth	420 x 310 x 105mm	**£13**
Double BBC Plinth	420 x 310 x 210mm	**£24**
Printer Plinth	420 x 310 x 105mm	**£12**
Single Master Plinth	490 x 310 x 105mm	**£14**
Double Master Plinth	490 x 310 x 210mm	**£26**

(Carr. Single plinth £2; double plinth £3)

Copy Holder



Whether you want to type in your latest program or the draft of a new trilogy, Watford's manuscript holders are superb for holding you paper at the ideal height and angle to allow you to read and type in ease and comfort.

Available in 2 full A4 versions, desk resting and shelf clamping. Paper is held firmly by means of a plastic retaining ruler and a clip grip. (for resting books or magazines, the desk top version is recommended).

Desk Top **£7** (carr. £3)

Angle poise **£12** (carr. £3)

Handy Printer Switch

A handy two way compact printer switch that enables you to connect 2 Micros to 1 printer, or 2 printers to 1 Micro. Attaches easily to your printer, monitor, etc. A low cost solution for educational establishments. Ideal for those wishing to use a dot matrix and a laser printer. Available in two configurations.

Compact AB Switch Centronics	**£19**
Compact AB Switch RS232	**£18**

(Cables extra at £6 each)

MEGABUFFER 256

The Smallest 256K Printer Buffer Unit in the world **38mm x 130mm x 134mm.**

This new Megabuffer 256 from Watford is a full featured 256K Printer Buffer. The features are:

- Improves efficiency by making more efficient use of computer and printer.
- Compatible with any computer and printer that uses Centronics Parallel connections including all BBCs, IBM PCs, etc.
- Total compatiblity with all software.
- Cheaper phone bills when using your Modems.
- Ideal for those doing large graphics screen dumps that are slow to print.
- Multi-Copy facility allows you to print several copies via Megabuffer without going through your computer.
- Data Dump facility is included.
- Built in text unit for both the buffer & your printer.

Only £119 (carr £5)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms, see the feature in our advert.

THE EPSON RX-FX-KAGA

Printer Commands Revealed

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you are with all sorts of printouts to show its capabilites – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out? Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX-KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English, how to use and make the most of your KP810, PW1080A or any other Epson FX80 compatible printers like Panasonic KX-P1080/1, etc., with the BBC Micro, both from Basic and Wordwise.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

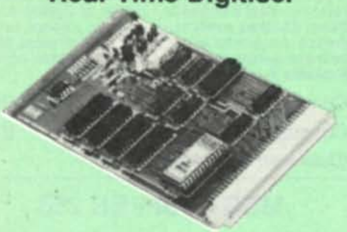
£5.95 (No VAT)

VISA

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Continued→ → → → → → → → →

Archimedes Real-Time Digitiser

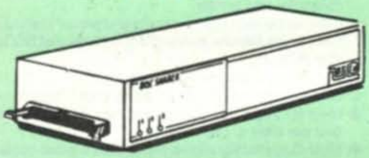


Watfords' Archimedes Video Digitiser is the most sophisticated digitiser ever designed for a micro. It provides a fast and flexible means of capturing images from a video camera or recorder for display and manipulation on the Archimedes range of Micros. Off-air televison signals may also be digitised via a video recorder or TV tuner. Please write for further details.

Price £249

A Set of Colour Filters for colour image grabbing using a video camera	£16

DISC DRIVE SHARER

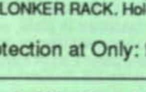


(Ideal for educational establishments)

At last, a low cost alternative to the Econet system.Watford's Intelligent Disc Drive Sharer allows you to connect 3 BBC micros (model B, B+ and Master series) to a single or double disc drive. Running under any DFS or DDFS, this intelligent unit will automatically queue the computers. Each computer has a status light dedicated to it. If it is green you will get immediate access to the disk, and red means that you are next in line. The unit plugs directly into the disc drive socket on each computer and is powered by the mains. (N.B. Not for use with ADFS.)

Launch Price : £65 Price includes 3 Cables

DISC PLONKER RACK



When using ones micro, there is a tendency to have more than one Disc on the desk. This exposes them to the harzards of fingerprints, scratches, dust, coffee and an untidy desk.
Why not protect your valuable data from all these hazards with the help of our extremely handy and low cost DISC PLONKER RACK. Holds up to eight 5.25" discs.

Protection at Only: £2

Acorn & Watford DFSs

● Watford sophisticated DFS ROM	£16.00
● Watford DFS Kit complete	£69.00
● We will exchange your existing ROM for Watford's ultimate DFS ROM at only	£12.00
● DFS Manual (comprehensive)	£6.95
● Acorn DNFS ROM	£17.00
● Acorn ADFS ROM only	£25.00
● Acorn 1772 DFS ROM Kit	£49.00

(The single Density DFS system is now old technology. Like Acorn, Watford too have decided to replace it with the their more up-to-date 1770 DDFS interface. We have informed most of the software houses of this decision in order that they can ensure compatibility with our highly sophisticated and fully Acorn compatible DDFS).

Watford's MkII 1770

Single/Double Density DFS

Many of our customers have wanted to use our superior DDFS and Acorn ADFS together. Now our Mk II DDFS Board with its 1770 Disc Controller, has been adapted to allow the use of Acorn ADFS as well. It also has all the commands of the Acorn's 1770 DFS, plus the added features.
Added features include:

- Acorn ADFS compatible – Use ADFS on our DDFS board.
- Tube host Code – No longer any need to have the DNFS in your machine to use Co-Processors, even the CoPro and Master 512.
- Auto 40-80 Track sensing – no need to fuss with 40/80 track switches (even works with protected disks).
- An extremely powerful 8271 emulation – ensuring compatibility with almost all software.
- New low profile – small footprint board.
- Fits with all third party ROM boards.
- Option to double the speed of file handling operations – BPUT and BGET.
- Operates in both single and double density modes.
- OSGBPB has been recoded, increasing still further the speed of file handling.

Please note that not all DDFS's are capable of providing either the full 80% storage increase or of allowing a file the full size of the disk – Ours allows both of these!
If you already have a DDFS (any manufacturer), and wish to upgrade to our MkII version, then simply return your existing ROM and DDFS board and we will supply the new DDFS for only **£30.00.**

● SPECIAL PRICE	£44.00
● DDFS Manual	(No VAT) £6.95
● We will exchange your existing DFS Kit for our sophisticated DDFS for only	£25.00

Please note, as the MkII DDFS is a hardware and sofware upgrade, it is not possible for existing Watford DDFS users to simply exchange the ROM for the new version.

DUST COVERS (For our Disc Drives)

Single CLS (without PSU)	£3.20
Single CS (with PSU)	£3.25
Twin CLD (without PSU)	£3.85
Twin CD (with PSU)	£3.90

3M – DISKETTES

3M – SCOTCH Diskettes with Lifetime warranty from Watford Electonics your 3M Appointed Distributor

● *10 x 5.25" S/S D/D 40 Track 744)*	*£5*
● *10 x 5.25" D/S D/D 40 Track 745)*	*£6.50*
● *10 x 5.25" S/S D/D 80 Track (746)*	*£8*
● *10 x 5.25" D/S D/D 80 Track (747)*	*£9*
● *10 x 5.25" 1.6M D/S D/D High Density for IBM XT and AT*	*£14*
● *10 x 3.25" S/S D/D 40/80 Track*	*£9*
● *10 x 3.25" D/S D/D 40/80 Track*	*£9*
● *10 x 3.5" High Density*	*£25*

TOP QUALITY 3.5" & 5.25" DISKETTES

To complement our range of Quality Discs and Disc Drives. WE are now supplying SPECIAL OFFER packs of 10 Lifetime guaranteed discs. Each disc has a reinforced hub ring. Supplied complete with selfstick labels and a Plastic Library Disc Box.

● *10 x **M3** 3.5" D/S D/D 80 Track*	*£9*
● *10 x **M9** 3.5" D/S High Density*	*£22*
● *10 x **M4** 5.25" S/S D/D 40 Track*	*£5*
● *10 x **M5** 5.25" D/S D/D 40 Track*	*£7*
● *10 x **M7** 5.25" D/S D/D 80 Track*	*£9*
● *10 x **M8** 5.25" D/S H/D Hi-Density*	*£14*
● ***M2** 3" Double Sided*	*£3 each*

Special BULK OFFER on 5.25" DISCS

(Supplied packed in Anti-Static Lockable Storage Units)
(Lifetime warranty on Discs)

PRICES SLASHED

BULK PACK DISCS in lots of 100

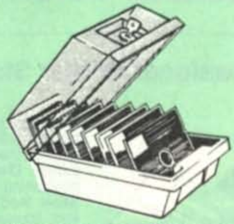
Type	S-S 40T	D-S 40T	D-S 80T
● Without Sleeves	£30	£35	£40
● With Sleeves	£33	£38	£43

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. it is very simple to use. Available in 3.5" & 5.25", please specify.

Price £4

ANTISTATIC LOCKABLE DISC STORAGE UNITS

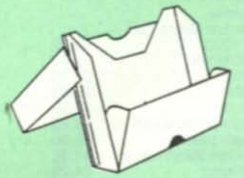


Gives double protection – Strong plastic case that affords real protection to your discs.
Antistatic helps avoid data corruption whilst in storage. The smoked top locks down.
Dividers and adhesive title strips are supplied for efficient filing of discs.

● **M35** – holds up to 50 5.25" discs	£4.95
● **M85** – holds up to 95 5.25" discs	£6.95
● **M25*** – holds up to 25 3.5" discs	£4.95
● **M50** – holds 50 3.5" discs	£6.50
● **M10** – holds 8 of No. 10 Data Cartridges	£15

* Not lockable

PLASTIC LIBRARY CASES



Holds up to 10 5.25" Discs. Only £2.00

DISC ALBUMS

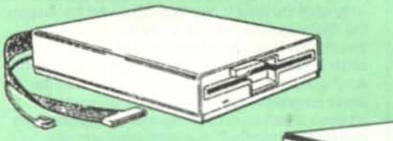
Attractively finished in black leather-look vinyl. Stores up to 20 discs. Each disc can be seen through the clear view pocket.

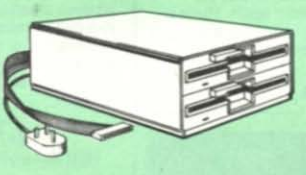
£4

Quality Disc Drives from Watford

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.
This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with an Utilities Disc.
The tinting on some of the boxes is used to indicate which Drives are 40 track (non-tinted) and which are 80 track (tinted). All our 80 track drives are already fitted with a 40-80 select switch.
All our Disc Drives are Double Sided and will operate in both Single and Double Density modes. *Extensive experience of the usage of disc drives suggests that the JAPANESE drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro.*
Various UK "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high qulity NEC and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public. If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.
Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate (extensive tests within our workshops have confirmed this). All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. ***Ideal for Schools & Colleges.*** *We are now able to supply all single disc drives with Power Supply, in either single or dual case. (Dual case has a twin data cable and a power supply capable of driving two disc drives) allows easy expansion to a dual drive unit, at a later date. Prices stated in the pricing boxes below are for single drives in standard single cases. Single drives in a dual case cost an extra £18. (At Watford we anticipate your needs of tomorrow, not just today!)*
When using a BBC Micro, most people find themselves short of desk space. The Watford's BBC Micro plinths form an ideal way of recovering some of this precious space) your BBC Disc Drive and Monitor can all occupy the same vertical footprint and still be comfortably situated. With the Watford Double plinth, your Disc Drive is mounted vertically at one side, leaving a very valuable area directly in front of you for such useful items as spare discs, pen, paper, reference manuals, etc. Follow the trend with a Watford plinth. (Turn to the 4th page of our advert for the Plinths).
P.S. All our 5.25" Disc Drives with PSU are compatible with the Compact Micro. All you require is the special Compact Disc Drive Cables designed by us.

Our Disc Drives conform to BS415





"Test Bureau Approved for Use in Education"

Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
400K (720K)	CLS400S £75	CLD400 £168	CS 400S £85	CD400 £188
800K (1,44M		CLD 800S £153		CD 800S £163

● TWIN Disc Drive Case, complete with Power Supply & Cables **£43**
Securicor carriage on Disc Drives £6 to £7

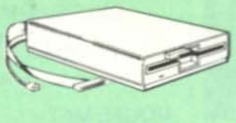
Prefix ***C** = Cased Drive*
***L** = Less PSU*
***S** = Single*
***D** = Double*

Suffix ***S** = 40-80 Switchable*

e.g. *CLS400S = Cased Disc Drive, Less power supply unit, single 5.25" 400K, (720K in double density); Double sided; 40/80 track switchable.*

Cable to connect 5.25" Disc Drives to BBC Compact
Single £9 Twin £12
Special Cable to connect both 3.5" and 5.25" Disc Drives simultaneously to the BBC Compact £13

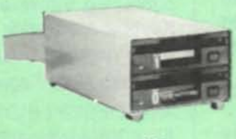
Special 40/80 Disc Drive/DDFS Mk II Offer



- ● The popular 40/80 track 400K single Disc Drive, Double Sided, cased with Cables. Plugs directly to your Micro.
- ● Watford's extremely popular DDFS Disc Interface (allows 720K storage). Will run in both Single & Double Density modes.
- ● A comprehensive User Friendly Manual.

A Bargain at Only **£119** (£7 carr) (Offer valid while stocks last)

3.5" DISC DRIVE OFFER



These top quality 3.5" Double sided, 80 track, 1 Megabyte (unformatted each Disc Drives), are attractively finished in BBC beige. They are supplied complete with all cables and a Utilities Disc.

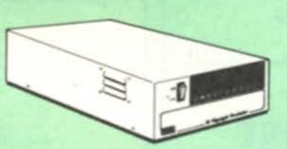
Drives to connect to BBC Micros own PSU

● CLS35 400K Unit £65 **● CLD35 Twin 800K £119**

Drives with built-in Power Supply Unit

● CS35 Single 400K £85 **● CD35 Twin 800K £129**

(P.S. CS35 Single is supplied in a twin case with a blanking plate to enable easy expansion to a dual drive at a later stage).



WATFORD's WINCHESTER DRIVES

Undoubtedly the best value for money Winchester Hard disc available anywhere for the BBC Micro.

This 30 Megabyte hard disc is completely compatible with the Acorn ADFS – that's why we have bundled it with each Winchester drive, along with a Utilities Disc.

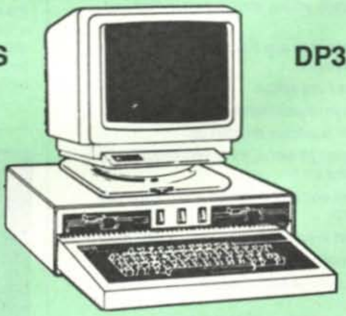
Finished in rugged metal and fetching BBC beige, the Winchester has an internal fan, so quiet you won't even hear it! A switched mode power supply and a neon-lit on/off switch are there along with a light on the hard disc to tell you when it is working – just compare the price with our competitors' 20 or 28 Mbyte discs!

Compatible with the Master, and the BBC B (with 17 X disc interface).

● 30 Megabyte BBC Hard Disc **£369** (carr £9)

CDPM 800S

DP35-800S



Twin 800K Double sided 40-80 track switchable disc drives mounted in an attractively finished Beige colour plinth for the BBC Micro. Supplied complete with integral power supply, cables and Utilities disc. The mains switch with neon On/Off light indicator, and the two 40/80 track switches are mounted on the front panel for ease of use.

CDPM 800S for the BBC B & Master £175

A Double disc drive with a difference! Times are changing fast for the floppy disk, and whilst the current standard for the BBC B and Master series is the 5.25" disk, the standard of the future will most certainly be the smaller; faster and more reliable 3.5 inch disks – now a standard feature of both the Master Compact and the Archimedes Series.

To support the present disc drive users, and cope with the future, we have designed our own plinth-mounted disk system – called the DP35 800S. It contains both the 5.25 inch and the 3.5 inch drive formats as well as offer a firm and rigid support for a monitor on top. With the BBC Micro underneath, the plinth makes a surprisingly small footprint on the desk – leaving you more space to work with.

The 5.25" disc drive is 40/80 track switchable. DP35-800S has its own power supply, independent of the BBC Micro.

DP35-800S for BBC/Master £165

(Securicor Carr. £7)

(The above drive units are 2 Megabytes unformatted)

Continued→ → → → → → → → →

QUEST MOUSE Mk II

● Quest Mouse II & Quest Paint	£58
● Quest Mouse II, Quest Paint, AMX Stop Press & Pagefont	£89
● Quest Mouse II only	£29
● Quest Paint Software only	£34
● Quest Font Disc (22 Text Fonts)	£15
● Quest Mouse Mat (Red or Blue or Green please specify)	£3
● Part Exchange your unreliable AMX Mouse for a Quest Mouse for only	£22

(P.S. Quest Paint is not compatible with BBC Compact)

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

ConQuest

Quest combined with ConQuest and Acornsoft GXR ROM make up THE MOST POWERFUL drawing packages available for the BBC range. Quest Paint is able to take advantage of almost any additions to your machine, such as Shadow or Sideways RAM. ConQuest takes this principal even further, by utilising the otherwise normally incompatible Sideways RAM facility by holding pictures in them.

Some of the features are:

- *Pick filenames off the screen for loading and saving.*
- *Rotate a cutout to any angle and Distort it to any four sided shape.*
- *Has Built in Font editor.*
- *Default brushes and patterns on startup.*
- *16 x 16 font available on start up.*
- *Ability to reset patterns, fonts and brushes to default at any time.*
- *ROM based enhanced Epson and compatible printer dump.*
- *ROM based enhanced extended picture routine.*
- *Ability to create and abort extended pictures.*
- *Improved disk access speed for extended pictures.*
- *User definable sideways RAM driver for incompatible sideways RAM systems.*
- *Ellipses at any angle on Master 128 (or B with GXR ROM).*

ConQuest ROM Package £30
(Price includes software in ROM and a comprehensive Manual).
(Not Compatible with BBC Compact)

NEW

ARCHI Mk II MOUSE

An extremely reliable replacement mouse for Archimedes Micro £39

RB2 Marconi TRACKER BALL

RB2 (AMX/Quest compatible)	£45
RB2 including Quest Paint	£75
RB2-A for Archimedes	£52

THE NEW Mk III AMX MOUSE

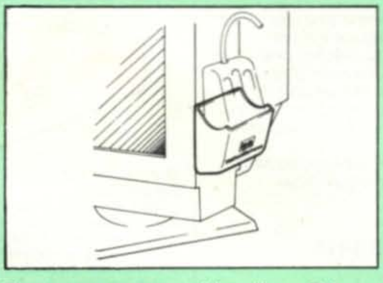
Inc. Super Art package

ONLY: £59 (carr £3)

(Please specify for BBC, Master or Compact)

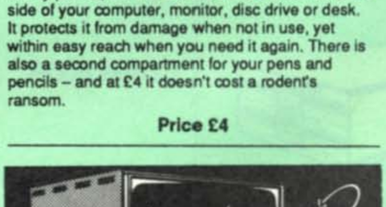
MOUSE MAT	£3
AMX MOUSE ONLY	£29
AMX SUPERART Package	£34
AMX STOP PRESS – A Desktop publishing software. Works with Keyboard, Joystick or a mouse	£32
PAGE-FONTS – Over 20 Fonts for use with AMX Pagemaker	£13
AMX DESIGN (ROM)	£55
AMX XAM Educational	£15
AMX EXTRA EXTRA	£16
AMX MAX A gem of desktop (ROM)	£20

WE MOUSE HOUSE



Treat your mouse to a cosy Mouse House. This handy little gadget solves the problem of where to store your mouse when it is having a rest. Made of sturdy plastic, the WE Mouse House attaches to the side of your computer, monitor, disc drive or desk. It protects it from damage when not in use, yet within easy reach when you need it again. There is also a second compartment for your pens and pencils – and at £4 it doesn't cost a rodent's ransom.

Price £4



Our Mark II Light Pen is the very latest in light pen technology. It is totally insensitive to local lighting conditions and works with many different monitors. The pen only responds to the High Frequency light produced by your monitor/TV. An LED indicates when valid video data is being produced. A conveniently located switch is also fitted. (Price includes FREE software Disc and Operating Manual)

Only £21

FLEET STREET EDITOR

Software pack for BBC Micro	£33
Software pack for the Master	£39
Admin Xtra Disc Utility	£13
Walt Disney Disc Utility	£13
Fonts N Graphics Disc Utility	£13

BEEB VIDEO DIGITISER

"Test Bureau Approved for Use In Education"

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem. The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional ★ commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROMs to work on it. A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image. Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£109 (Carr. £5)

(BBC B+ and Master compatible, except Master with Econet)

(Price Includes) Digitiser Unit, Software in ROM & a Comprehensive Manual)

Magazine Maker

(As seen on TV)

A combination of Stop Press and Watford's Beeb Video Digitiser.

Using any video that provides a composite signal and the digitiser, images from a camera or TV can be converted into a graphics screen on the BBC Micro.

They can then be used within Stop Press to illustrate magazines or newsletters – in fact anything that needs to be created on A4 size paper.

With Stop Press's many features, a variety of pictures can be composed – the only limit being the imagination.

Pictures can be doctored using Stop Press's graphics option to produce any number of effects.

Text can be formatted around the digitised photo on screen using the facilities available, which include 16 typefaces, character and pattern definer, text formatting and the ability to load in Wordwise and View files plus much more.

Once created the picture can be printed out.

The Magazine Maker is suitable for any use that requires illustrated documents.

Complete Package **£135.00** (carr. £3)

WAPPING EDITOR
"MIGHTIER THAN THE QUILL"

Winner of the BBC Acorn User 1990 Award for the Best Art/ Graphics software

The WAPPING EDITOR

The Wapping Editor from Watford Electronics represents a breakthrough in Desktop Publishing for the Beeb. The package includes a 64K ROM containing ALL the software needed to get into print fast; a very sophisticated graphics module, professional quality typesetting software, a word processor, a comprehensive font editor for designing your own typefaces, and a variety of printer dumps. This mouse-driven system is designed for the BBC B, the B+ and Master computers and will take full advantage of any Sideways and Shadow RAM that may be fitted. It will run under DFS, ADFS and Network filing systems and requires as a minimum just a single 40 track drive.

Included with the system is a utility disc containing several high quality fonts, various utilities and a ROM image of a Support ROM. A comprehensive 100 page manual completes the package. The Support ROM contains routines to allow an area to be rotated to any angle or distorted to any four-sided shape. Also included are facilities to draw ellipses at any angle and sectors, segments and arcs (in Master or BBC B with Acorn GXR). Another of the features of the Support ROM is a 'Turbo DFS' which gives DFS access times comparable with those of ADFS.

PAGE LAYOUT SECTION

The Wapping Editor may be used to create pages of any size from an A6 to a full A3 page. If none of the eight default page types suit your purpose, the stand-alone page creation program may be used to create pages to your own requirements. By using proportionally spaced fonts and genuine microspacing it is possible to print over 150 characters across an A4 page. A unique feature of the Wapping Editor is the 'A5 x 2' page size allowing two A5 pages to be printed side by side onto a single A4 sheet.

The graphics module is a mode 0 version of the highly acclaimed Quest Paint package, detailed elsewhere in our advert, and incorporates all the same drawing facilities, e.g. pencil, brush, airbrush, polygon, circle, ellipse, fill, cut-and-paste, etc., etc.

Text may be typeset, either justified or unjustified, in any font anywhere on the page. Simply select which font and text document you wish to use, and pull out a rectangle on the page where you want the text to be – it's as simple as that! Multiple columns may be printed just as easily and a special 'expand' feature may be used to expand the microspacing so that the document exactly fits the space defined.

WORD-PROCESSOR

The integral word processor is the ideal tool for producing your text documents, although text can of course be read in from any of the other popular word processors such as View, Wordwise etc.

THE FONT EDITOR

The font editor module will allow you to design your own typefaces or to modify the ones provided on the utility disc. This sophisticated editor has numerous functions designed to take the tedium and frustration out of producing good looking, well balanced fonts. Each character may be individully proportionally spaced and characters of any size up to 16 x 16 pixels may be defined.

Upgrading to the Wapping Editor could not be easier since the font editor will convert fonts from other packages, such as Quest Paint or Stop Press (formerly Pagemaker), into Wapping Editor format and a mode conversion utility will convert any screen in modes 1, 2, 4 or 5 into a full grey-scale mode 0 screen. Pictures may also be 'grabbed' from a video source by using the Watford BEEB Video Digitiser, either independantly or from within the Wapping Editor package.

Wapping Editor Software Pack	£69
Wapping Editor plus Mouse	£89

(Wapping Editor only works with Master Compact if a Mertec Expansion box is fitted)

Wapping Art Disc

Over 250K of clip art to cut and paste into your Wapping Editor pages. Pictures include maps, transport, people, media, sport, games etc.

Two 'ratio' screens for use with hi-res and rotated A5 pages to ensure images are not distorted when printed out.

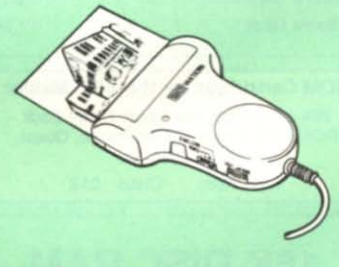
Music writing symbols in the form of pattern and brush for quick production of manuscripts are included together with staves.

There are two prepared hi-res pages layed out for printing labels, both single and double width. Ready made label designs are included but these can be easily replaced with your own designs.

A Mode 0 screen dump routine is also included. To pack such a large amount of data onto the discs the screens have been compressed and routines to compress and expand Mode 0 screens are included on both discs. Using the packing routine you can archive large numbers of screens onto a single disc.

£15

The Beeb HandScan
Hand-held Scanner for the BBC Micro



Watford Electronics are pleased to announce the launch of the first hand held scanner for the BBC Micro. HandScan is a compact unit which will allow photographs, diagrams, or any other documents to be digitised quickly and easily, to then be used in a desk top publishing package, art program, or even in your own Basic programs! These useful devices have been available for faster and more expensive micros for some time, but only now is Watford Electronics able to offer the BBC Micro computer.

The HandScan plugs directly into the 1MHz bus on the BBC while a comprehensive set of utilities provided by the sophisticated ROM firmware. The scanner has a resolution of either 100 DPI or 200 DPI when accuracy is essential. Pictures as wide as 4" may be scanned in mode 0 and various types of dithering may be selected to simulate the grey levels of a scanned picture.

All necessary software has been included in the firmware to allow the scanner to read images directly into our Wapping Editor with little more than the click of the mouse. The digitised picture may then be incorporated into your magazine, newsletter, report or any other document.

Beeb HandScan & Firmware	£135

Wapping Font Disc

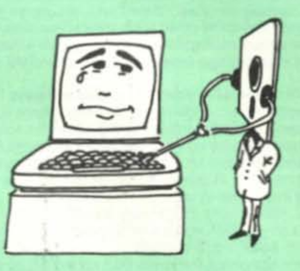
Sixteen Wapping Editor fonts including smaller versions of Oberon and Daisy and two new sizes of the standard font.

Also included are three Mode 0 screens containing giant 'headline' fonts to cut and paste to create extra smooth headlines.

Supplied complete with instructions.

£12

DIAGNOSTICS DISC



The BBC Micro is a very complex machine and thus diagnosing a fault can be very difficult. At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

(Only suitable for BBC B with 8271 DFS)

Payment may be made by credit card, Connect card or cheque, but we also have available a range of finance terms see the feature in our advert.

NEW

Beeb DOS 2.2

The BBC and IBM PC's are the most popular micros in the UK. The BBC is firmly established in the education sector and the IBM is the industry standard in the business world. The pools of information and applications held on these computers are immense, yet the means of passing information between them are very limited. Beeb DOS provides a practical method of transferring information between these two micros.

Beeb DOS is a collection of utilities which run on the PC's and enable it to read and write information on BBC discs. You can transfer files between your PC's 360K floppy, high density floppy or hard disc and your BBC discs. In addition Beeb DOS allows you to catalogue, format and compact BBC discs and delete, re-name, lock and unlock BBC files, all on PC's. Each Beeb DOS utility is written in IBM assembler and is run directly from PC or MS-DOS. The Beeb DOS utility can be run from floppy disc, hard disc or RAM drive.

Beeb DOS is supplied on an IBM 5.25", 360K disc complete with a comprehensive operating manual. (Will only work on 360K Disk Drives)

Price: £39

(Please write in for technical literature)

Continued→ → → → → → → → →

ARIES CORNER

B-32 Shadow RAM Card

Like the BBC B+, the B32 provides 20k of shadow screen RAM and 12k of sideways RAM. Unlike the B+, the B32 has simple software commands which allow the user to reconfigure the RAM as 16k of shadow RAM and 16k of sideways RAM, or all 32k as sideways RAM.

With the B32, the programmer gets up to 28k of RAM available for Basic, Logo, Cobal, Forth, Lisp and BCPL programs in any screen mode. The business user gets extra memory for View, ViewSheet, Wordwise Plus, Interword and many other applications. For advanced applications, the scientific user gets access to a massive 47k of data storage using the Acorn approved ★FX call.

Sideways RAM enables you to load sideways ROM images from disc, allowing you to have a large library of sideways ROMs (subject to the copyright holder's permission) stored on disc. The B32's sideways RAM can'also be used to extend any operating system buffer (such as th printer buffer) or to load tape programs into a disc system.

The B32 simply plugs into the 6502 processor socket on you BBC micro – no flying leads to connect and no soldering. Provision of the onboard ROM socket means that the Aries-B32 control ROM does not use up one of your existing ROM sockets.

● Recommended by Computer Concepts for use with their Inter series of ROMs.

Price: **£69** (carr. £3)

Aries B-12 Sideways ROM Board

The B-12 provides a total of twelve sideways ROM sockets (the four in the original machine are replaced by the twelve on the board), all fully accessible by the MOS sideways ROM system. In addition, there are two sockets fot sideways RAM, giving up to 16k of RAM using 6264 static RAM chips.

If you do not have a B32 or B20, a small adaptor module (the Aries-B12C) is available at a nominal cost

Price:	Aries B-12	**£36**
	Aries B-12C	**£5**

ARIES B-488 IEEE-488 INTERFACE UNIT

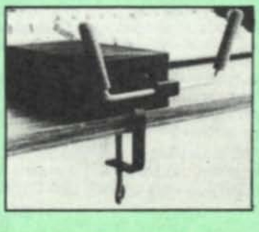
The Aries-B488 is an interface unit to enable the BBC micro to control and monitor IEEE-488 bus systems. The IEEE-488 bus (also known as the 'GPIB or 'HP IB') is the standard method of interconnecting programmable laboratory instruments and control equipment. Using the B488, up to 15 devices may be connected in a single high-speed data network.

£238 (Carr £3)

VOLTMACE JOYSTICKS

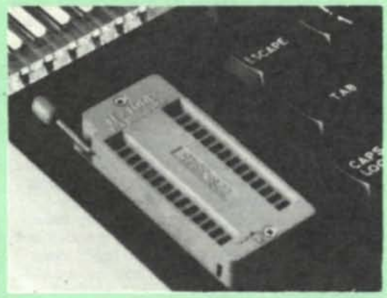
Delta 3B Single Joystick	**£10**
Delta 3B Twin Joysticks	**£15**
Delta 3C Joystick for Compact	**£10**
Delta 14B Single Joystick	**£11**
Delta 14B/1 Adaptor Module	**£12**
Transfer Software Disc-Tape	**£7**
Delta-Cat A mouse eliminator Joystick for the Archimedes	**£24**

Delta Base B



Analogue aircraft style yoke Joystick to run in the analogue port of the BBC B & Master 128	**£25**

SIDEWAYS ZIF SOCKET



Allows you to change your ROMs quickly and efficiently, without opening the lid. The ZERO INSERTION FORCE (ZIF) socket is located into the ROM Cartridge's position.

● Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

● The low profile of the socket allows unrestricted access to the Keyboard.

● All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

● This versatile hardware solves the problem of running out of socket space. Simply lift the ROM from the ZIF & insert a different one (No pulling or pushing of Cartridges. It is a must for professionals and Hobbyists alike.)

● BBC, B+ and Master compatible.

ONLY **£18** (carr £3)

Low Profile CARTRIDGE SYSTEM

Complete System consists of: Low profile ROM Cartridge, Socket housing, Cable assembly, 5 labels and a library storage rack for the BBC B.

● Complete System	**£11**
● Spare Cartridges	**£2.50**
● Spare Rack	**£1.50**

ROM Cartridges for the BBC Master

Will accept the new larger Piggy Back ROMs like: Interword, Interbase, Quest, Conquest, etc

Twin **£8;** Quad **£12**

16K DISC RAM

(16K Sideways RAM Module)

Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.

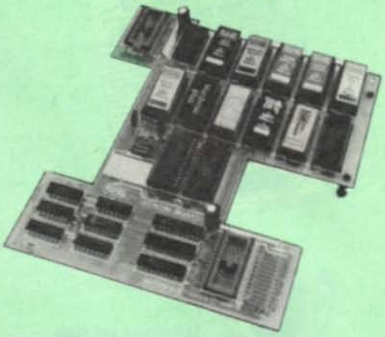
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances)
- Compact construction
- Supplied complete with Battery Backup.
- No overheating or overloading problems.
- Free utilities disc supplied
- Can be used as a 16K PRINTER BUFFER.
- Ideal for profressional software development.
- Supplied with utilities software disc.

Only: **£32** (carr £2)

P.S. 16K Disc Ram Board is not designed to work in conjunction with a Sideways ROM Board.

SOLDERLESS SIDEWAYS ROM SOCKET BOARD



The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:

- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 takes two 6264 RAM chips.
- Read protect to make RAM "Vanish") allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £35
Battery Backup fitted **£39**
Battery Backup only **£3**
16K Sideways RAM **£8.50**
(carriage £3)

● Sideways RAM Utilities Disc for Solderless ROM Board. Includes the options to load and save ROM Images and the facility to use Sideways RAM as Printer Buffer.

Only: £8

FINANCE AVAILABLE

In these days of expensive borrowing, we are pleased to have negotiated a special low rate finance deal for our customers, with flat interest rate of 12.25% per annum, typical APR 25.5%.

In addition to the above, we are able to offer all Archimedes and BBC Master computers as well as selected hardware on a 0% interest free finance deal.

For further details please telephone: 0923 37774 ext 223/203/201.

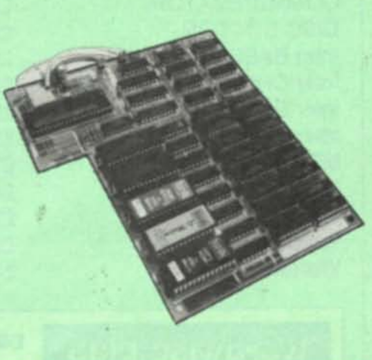
USER PORT SPLITTER UNIT

User Port Splitter
A
B

Gone are the days when you had to plug and unplug devices from the User Port. This extremely useful little device allows two units to be connected to the User Port simultaneously, and select between them simply by toggling a switch. This device is particularly useful for those people using Quest Mouse and the Watford Video Digitiser or any similar combination

Excellent Value at **£22** (carr £2)

ROM/RAM CARD



Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 6 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- NO User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with BBC micros (not BBC+ or Master).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Software Write protect for ALL RAM.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Accepts any ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROMSPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM-RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM-RAM Board.

The ROM-RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, for later.

Please write in for further details.

INTRODUCTORY PRICES:

● ROM/RAM card with 32k dynamic RAM	£48
● ROM/RAM card with 64k dynamic RAM	£65
● ROM/RAM card with a massive 128k dynamic RAM	£109

(carriage on ROM-RAM Card £3)

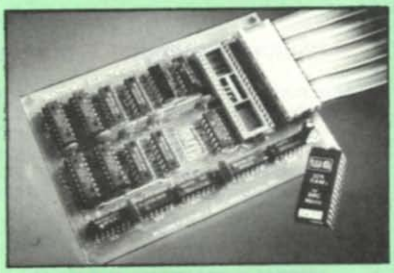
OPTIONAL EXTRAS:

● 16k plug-in Static RAM kit	£9
● 16k Dynamic RAM for Upgrade	£13
● Battery backup	£3
● Read and Write protect switches	£2 each
Complete ROM-RAM board All options installed	£115

P.S.

IS your existing ROM Board overflowing with ROMs? Do you need more Sideways RAM? Is your Board unreliable? Then upgrade to Watford, ROM/RAM Board and pay £5 less.

32K SHADOW RAM-Printer Buffer Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Don't throw away your BBC B for a BBC B Plus or BBC Master. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16k or even 20k, but a massive 32k of extra RAM!!!

● IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

● "VIEW" Wordprocessor users can now type in letters in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

● In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24k of text in memory. This product is recommended as an ideal complement by Computer Concepts.

● Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20k of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28k of program space.

● Use the FULL 32k or the bottom 12k of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS432 etc. Print large text files while running long graphics programs, and have all your buffer options available as well (*FX15,21,138, 145,ADVAL etc). Please note only a 12k printer buffer can be used with Wordwise or Wordwise-Plus, due to the way they are written.

● Unique facility to turn ROMs off and on again. Unlike all other ROM managers, this feature does not use 'unofficial' memory. Two bytes of normally user-inaccessible memory on the RAM card are used to ensure ROMs are disabled WHERE OTHER ROMS FAIL.

Only £59 (carr £3)
(Price includes a comprehensive manual and the ROM)

INCREDIBLE WORDPROCESSING DEAL

Watford's 32k SHADOW RAM CARD and Computer Concept's INTERWORD Wordprocessor package.

at Only **£89** (Carr £3)

CREDIT CARD 24 HOUR
Ansaphone Hot Lines
(0923) 50234 or 33383

Acorn Speech Synthesizer package complete, for the BBC B Microcomputer

Special Offer £18

BBC SOFTWARE'S Popular Educational Software

● Maths with a Story 1 (Disc). 4 primary level maths programs	£11.25
● Maths with a Story 2 (Disc). 4 further maths programs.	£11.25
● Picture Craft (Disc) 6-14 age group. Pack consists of flexible geometrical design & colouring programs.	£17.00
● RELATIONSHIP: Science (Disc) O-Level Biology program.	£20.00
● BONDING: Science (Disc) O-Level Chemistry program.	£20.00
● ELECTROMAGNETIC SPECTRUM (8 Discs) O-Level program.	£20.00
● ELECTRONICS IN ACTION (Disc) O-Level program.	£19.95
● NEWTON & THE SPACE SHUTTLE (Disc) O-Level program.	£20.00
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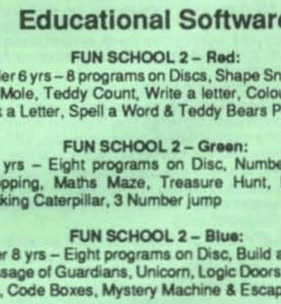
Versatile BEEB SPEECH SYNTHESISER Unit



The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. These can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32 (carr £3)

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Watford's own Sophisticated VIEW PRINTER DRIVERS

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All this for only **£21** (Disc)

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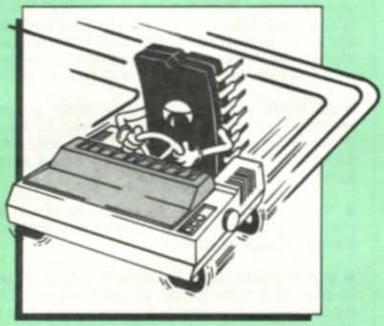
VIEW PRINTER DRIVER ROM



View is a powerful word processor, but until now has seriously lacked in terms of printer support. With the launch of our Printer Driver ROM, which includes an extremely powerful and easy to use Printer Driver Generator, View users can find themselves in the realms of advanced word processing at only a small outlay.

The VPD extends View's printer command with a series of mnemonic commands. All standard highlight sequences are also supported. A large range of printers are supported by drivers contained within the ROM (the drivers can be downloaded and customised). Printers supported include: Epson's MX, RX, FX, LX, JX80 range, HI80, KP810/910, PW1080, JP101, HR15, M1009, GLP, Panasonic KX-P1081/2, JUKI 6100, etc.

Other printers are readily supported by defining a Printer Driver using the built-in Printer Driver Generator. The features mentioned below are available to both the built in Printer Drivers and user defined drivers (assuming the printer supports the features).

NLQ control, Underline, Bold, Proportional Spacing, Microspacing, Italic, Superscript, Subscript, Condensed, Enlarged, Double Strike, Set lines per inch numerically (e.g. LPI 6), Set characters per inch numerically (e.g. CPI 5), Select printer font, Select printer ribbon colour, Translation sequences, Emulation of BBC Character Set, Simple numeric expressions for certain operations, Full printer setup, Send control codes, Print prompt on screen, Redifinable Pad character, Pause for key press, Prompt to change daisywheel, and Execute ★ command when printing.

Other features include a very powerful on-screen preview, with bold, italic, underline, super/subscript, enlarged highlights, and a special printer driver to allow memory-based text to be previewed by View 1.4. Of course, View 1.4, 2.1 and 3.0 are all supported, as is Shadow RAM and 6502 Second Processors. The BBC B series and Master series of micros are supported. A comprehensive manual is supplied. All in all, a very professional product for the discerning user who wants power at their finger tips. (Write in for a detailed leaflet).

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Wordwise plus **£40**

We are giving away absolutely FREE, the superb Word-Aid ROM worth £24, with every WORDWISE PLUS package bought from us.

Word Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear test-segment area.
- BBC B, B+ and Master compatible.

Only **£24**

(N.B. Word Aid requires a Disc interface in your Micro)

NEW

The Complete Mouse User Guide to BBC Micro

This manual has been written to reveal the secrets of the mouse. It explains all the principles required by the hardware and associated software, and also example listings for inclusion into custom programs. The manual first details the basic principles of the mouse and a simple program which uses these principles. This information should be adequate for most applications. However, it is possible to improve the performance of the mouse by expanding on the principles already used in the software. This is again fully explained and an example program given.

It is possible to gain a full understanding of the mouse from this manual. For those not interested in exactly how the mouse functions, complete example programs are also included. These may be typed directly into the micro, without the need for any understanding of the hardware or software involved, enabling the mouse to be used for custom applications.

Price £5.95 (No VAT)

Example programs on Disc £4.95

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"Why has no-one written a book like this before? It's long overdue".

If you own a BBC-B, BBC B+, Electron, Master 128, Master Compact or Archimedes then this book is for you. It shows you how to get the most from your computer, and how to make the computer work for you. Although some sections are machine specific, most of the information, programs, hints and good solid experience are for the whole range of BBC machines. The general style and level means that both beginner and expert will feel satisfied with the quality and quantity of the material.

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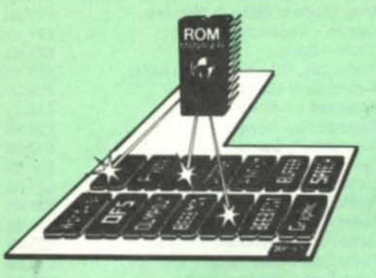

Take control of your Sideways ROMs with ROM Manager. This powerful utility ROM gives you power over your sideways ROMs . Disable whole ROMs, send commands directly to named ROMs and many other powerful facilities.

"Provides comprehensive management of all your installed ROMs". (BEEBUG November '84.)

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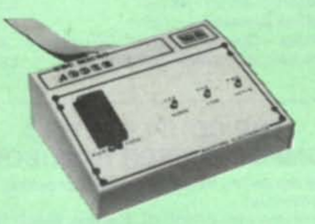
ADDER



The only low cost EPROM Programmer for the BBC Micro that will program both the standard 21V and the new 12V5, 27128 EPROMS.

Adder is the ultimate EPROM programmer for the BBC Micro. It will program many different EPROMs up to the very latest 27256 32K devices.

The Adder unit connects to the User Port and draws its power from there too. The EPROM is mounted in a top quality ZIF socket. There are no switches or controls as Adder is entirely software controlled.

The Adder software provides sophisticated facilities for programming EPROMs from a RAM image produced by loading disc files. The software is menu driven and designed for ease of use.

Features:

- Two ultra fast programming algorithms or standard slow algorithm.
- Supports standard 21V programming and newer 12.5 volt EPROMs. (Software switched).
- The RAM image to be programmed can be built up in many ways. Sections of image can be loaded separately. Part programming. Read EPROM. Edit data in memory.
- Automatic processing to handle a list of files to program into the EPROM.
- Automatic disc buffering to allow programming of 32K 27256 devices from a 32K file without extra effort.
- Verification gives detailed error list and checksums are maintained. There is also a blank check facility.
- Works with all standard filing systems. Generates header code for RFS ROMs to allow Basic programs etc. to be stored in EPROM. More than one file per ROM permitted.
- Programs the following EPROMs:
  From 2K to 32K: 2516, 2716, 2532, 2732, 2764, 2764A, 27128, 27128A, 27256 (Both 12.5V and 21V).

£65 (£5 Carr)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

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This 415Ml, king size multi-purpose foam cleaner spray is ideal for cleaning the Keyboard, Monitor, Disc Drive and your computer furniture surfaces. Simply spray on the surface to clean and wipe off with a clean cloth.

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Ideal for cleaning and preventing static build-up on TV/ Monitor Screens.

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This simple to use aerosol spray is ideal for removing Dust and Dirt deposits from the Keyboards and similar inaccessible places. **£3**

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Replacement FLEXIBLE 17 way Keyboard Connector **£4**

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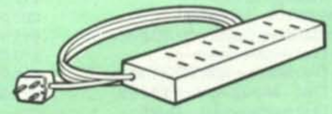
Fitted in place of your normal mains plug, this device protects your equipment (and data from corruption), against mains high voltage translent spikes/surges caused by lightening or thermostats switching.

Protection for only **£8.50**

4 Way Mains Distribution Socket



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals.

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A 4 way mains distribution unit as above with a built-in Surge Arrester, providing protection for your complete computer system

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This extremely useful tool allows you trouble free chip insertion and removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip. **£2**

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Increase the speed of your Disc Drives by soldering this switch to your BBC B or B+ keyboard

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28 pin ZIF SOCKET (Textool) **£6.95**

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(All ready made and tested)

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Supply from BBC power supply to standard Disc Drive connecSingle **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS

BBC to Disc Drives Ribbon Cable

Single **£4** Twin **£6**

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Disc Drive Plug 4 way	100p	–
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Watford DATA DUCK

Convert two single Disc Drives into one Dual Drive with this simple external unit (Suitable for Disc Drives with PSU. For Disc Drives without PSU, you will also require Watford Power Duck, see below).

£14

Watford POWER DUCK **£8**

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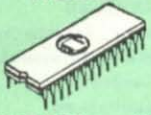

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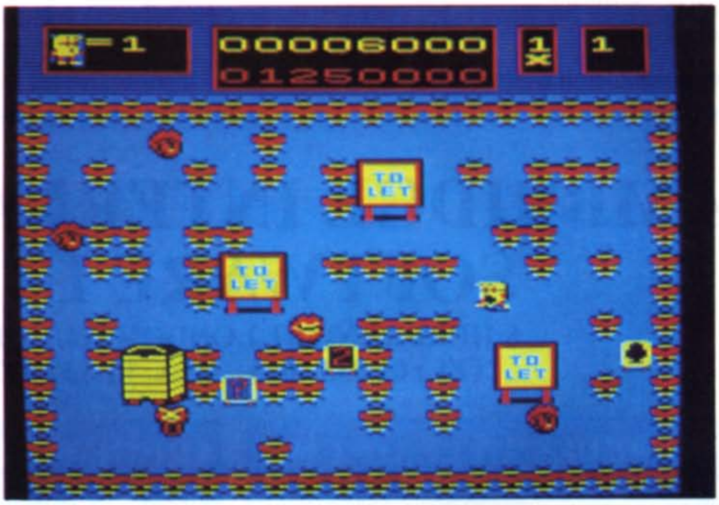
But someone forgot to tell you that the area is populated by vicious floating mouths that will devour you and wipe out your carefully plotted path. Not only that, but the P32 robot is a few bolts short of a full complement and if you don't arrange the path immaculately he'll end up anywhere but where you want him.

Once you've built on all the To Let areas on one screen you move on to the next. The controls are:

Z,X,*,?	Move left, right, up and down
D	Drop bricks
B	Hyperspace
Return	Lay path
Space	Erase path
Shift	Activate robot
Tab	Select a screen.

A number of other things appear on the screen from time to time and collecting them causes different effects – but we must leave you something to find out for yourself. Type in Listing I and ensure it is correct using the checksums. Save, then run it. This generates a data file – called DATA – which contains all the sprite information for the 16 screens.

Next enter Listing II, check it with Get it Right!, save it – important because the second relocates down in memory – and run it for a really great game.



Listing I

```
 10 REM Dickie Brickie Sprite Data
 20 REM by Mike Goldberg
 30 REM (c) The Micro User
 40 HIMEM=&5C00:H%=HIMEM
 50 T%=FNstart:Q%=FALSE:X%=ASC"X"
 60 REPEAT T%=T%+5:REPEAT
 70 IF T%?1<>X% PROCput ELSE Q%=TRUE
 80 T%=T%+3:UNTIL ?T%=13 OR Q%
 90 UNTIL Q%:X%=&700:Y%=X%DIV256
100 $X%="SAVE DATA 5C00 "+STR$~H%
110 CALL &FFF7:END
120 :
130 DEF PROCput
140 N%=EVAL("&"+CHR$T%?1+CHR$T%?2)
150 FOR L%=1 TO ?T%-32:?H%=N%
160 H%=H%+1:NEXT:ENDPROC
170 :
180 DEF FNstart:LOCAL P%
190 P%=PAGE:REPEAT P%=P%+P%?3
200 UNTIL $(P%+4)="START":=P%+P%?3
210 :
220 START
230 *!EE!CD"8B!07!16!1C!48!BB!15"0E!0F
240 *!2D!C1!00!2C!16!07"8B!CD!CC!EE!20
250 *!E1!C3"0E!1D!11!33!EE!CD"8B!07!06
260 *!0D!0B!BB!15"0E!0F!03!05!02!0D"05
270 *!89!8A"CC!EE#0A!4A!0E!1D!11!33!EE
280 *!CD!8A!9C!35!37"6A!77!3B!15!93!CA
290 *!C5!E5!65!6A!37!35"9A!CD!CC!EE!65
300 *!CE!CA"95!3B!33!77!EE!CD!8A!8D"07
310 *!0F!0C!77!3B!15!1B!4A!0E!0F!03!0B
320 *"07"8B!CD!CC!EE!0D"0E"1D!3B!33!77
330 *!99!60!F0"96"94!F0!99!60!F0"96"92
340 *!F0!61!89&8B!68!19!1D"95!1D!95!1D
350 *!EE"DC!77"B3!CC!89&8B!33!19!1D"95
360 *!1D!95!1D!77!08!0F!4B"0F!07!03!11
370 *!0E"01#0F!0E!44!08!0F!4B!0F!07!8B
380 *!CC!11!0E"01"0F!0E!11!CD"8A!9A"8B
390 *!89!CC!11!0E"0B#0F!0E!CD"8A!9A"8B
400 *!89!CC!11!0E"0B"0F!0E!11!EE!CD#8A
410 *!02!09!1E!77!3B#15!04!09!87!09!45
420 *"CD#8B!88!09!2A"3B#1D!11!EE$CD!CC
430 *"CD!77$3B!33"3B!CD!CC"CD#8B!88!3B
440 *!33"3B#1D!11!CD"8B!01!06#0F!15#0E
450 *$0F!05!8A!DD"FF!CC!88!CC!07!0E!11
460 *"FF!33!11!33!CD"8B!01!06#0F!15#0E
470 *$0F!05!8A#98!CC!88!CC!07!0E!11!77
480 *!F7!B3!D1!73!8A"05!07!0F!0D"0F!15
490 *"0A!0E!0F!0B"0F!0E!06!03"8B"89!CC
500 *!07!06!0C"1D"19!33!8A"05!07!2D!0E
510 *!0C!0A!15"0A!0E!4B!07!03!05!2D!24
520 *!00!A8!B8!9A!89!CC!4B!42!00!51!D1
530 *!95!19!33!8A"06!07!8B#CD!15"06!0E
540 *!95#3B#CD!A9!07"06!8A#3B!1D!0E!06
550 *!17!15%CD!CC"CD%3B!33"3B"CD!CC%CD
560 *"3B!33%3B!FD"DD!CC"88!89!CC!FB"BB
570 *!33"11!19!33!AA"00"44!66!22!AA!55
580 *"00"22!66!44!55#DD!CC!89!8B!89!CC
590 *#BB!33!19!1D!19!33!EE"DD"BB$77"BB
600 *"DD#EE#FB!B9#FD!DC#FD!D9#FB!B3!FE
610 *!EC!BD!1B"5F!15!BB!F7!73!DB!8D"AF
620 *!8A!DD(FE(F7!FE!EC!BD!1B"5F!15!BB
630 *!F7!73!DB!8D"AF!8A!DD!EE!DC"B8!DC
640 *"CD!DC!B3"77!B3!D1"A4!E0"B8#70!B8
650 *!CC!DC"51!D1!B3!77"B3!77!DC"EE!DC
660 *!B8"52!70!77!B3"D1!B3"3B!B3"A8!B8
670 *!DC!EE"DC!EE"D1#E0!D1!33!B3!FE!ED
680 *!DC#EE"CC!F7!7B!B3#77"33!CC"CD!DC
690 *"CD!CC!EE!33"3B!B3"3B!33!77!FC"C8
700 *!B8!CC!EE!CC!88!F3"31!D1!33!77!33
710 *!11!88!01!03!30!03!89!88!CC!11!08
720 *!0C!C0!0C!19!11!33!8A"05!07!0F!2D
730 *!0D!87!15"0A!0E!0F!87!07!2D!5B!86
740 *!0A!85!07!8B!CD!EE!4B!3C!0B!24!1C
750 *!08!33!77!8A"05!07!0F!2D!0D!87!15
760 *"0A!0E!0F!87!07!2D!48!80!08!80!04
770 *!8B!CD!EE!43!30!03!20!14!08!33!77
780 *!DC!A8!30!14!04!8A!8B!04!D1!A0!60
790 *!D1!33!15!3B!77!05!8A!8B!04!05!8A
800 *!8B!04!3B!15!3B!77!3B!15!3B!77!B8
810 *!50!60!B8!CC!CD!8B!CD!B3!51!D1!B3
820 *"77!3B!77!8B!CD!8B!CD!8B!CD!8B!CD
830 *!3B!77!3B!77!3B!77!3B!77!EE!DC"B8
840 *!88!8B"07!45!83!C2!C3!83!06"0E"43
850 *"07!43!C3!81!66"2C"0E!24!3C!18!66
860 *!2A!1C!34!3C!0C!8B"07!77!B3"D1!91
870 *!06"0E!43!42"06!8A!8B!CD!EE!2C!24
880 *"06!15!1D!3B!77!FE!DC!88!8C!8E!03
890 *!05!06!F7!B3!11!13!17!0C!0A!06!07
900 *!8B!89!88#CC!88!0E!1D!19!11#33!11
910 *!FE!DC!CF!8E!88!00!20!00!F7!B3!3F
920 *!17!11!00!40"00!8C!8A!8F!CF!CD!CC
930 *!88!00!13!15!1F!3F!3B!33!11}00}00
940 *}00}00}00}00}00}00}00}00}00!00!F8
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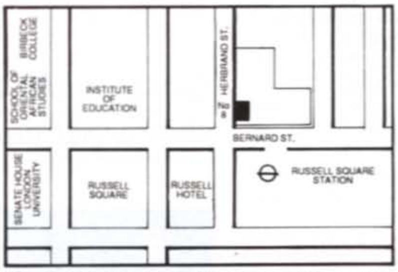
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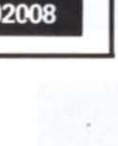

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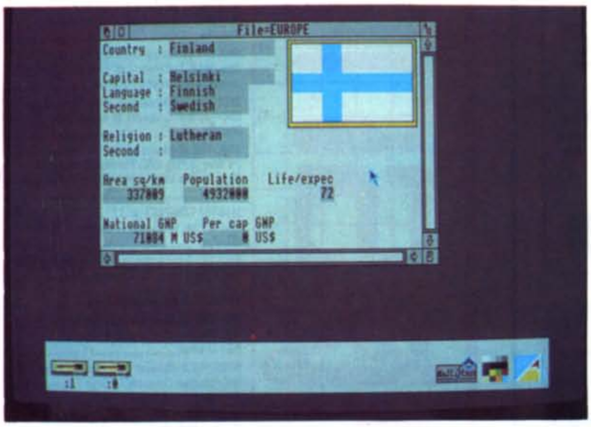

File=EUROPE

Country : Finland

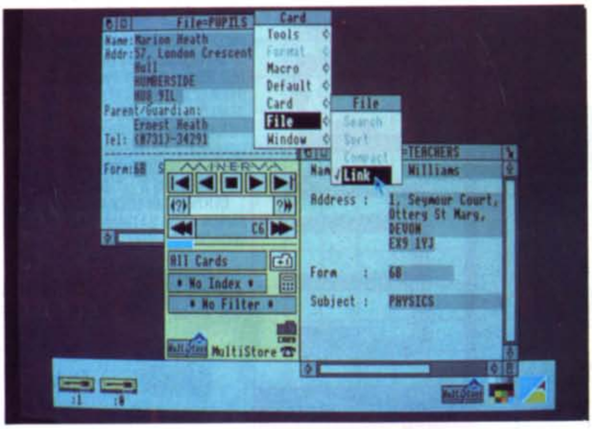
Capital : Helsinki
Language : Finnish
Second : Swedish

Religion : Lutheran
Second :

Area sq/km 337009 Population 4932000 Life/expec 72

National GNP 71004 M US$ Per cap GNP 0 US$

Incorporating sprites


File=PUPILS

Name: Marion Heath
Addr: 57, London Crescent
Hull
HUMBERSIDE
HU8 9IL
Parent/Guardian:
Ernest Heath
Tel: (0731)-34291

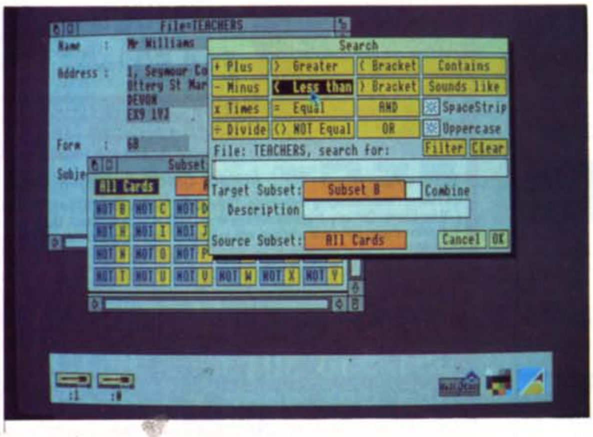
Form: 6B

=TEACHERS

Name : Williams
Address : 1, Seymour Court,
Ottery St Mary,
DEVON
EX9 1YJ
Form : 6B
Subject : PHYSICS

Card
Tools
Format
Macro
Default
Card
File
Window
File
Search
Sort
Compact
Link
MINERVA
C6
All Cards
• No Index •
• No Filter •
MultiStore
:1
:0

Linking two databases


File=TEACHERS

Name : Mr Williams
Address : 1, Seymour Co
Ottery St Mar
DEVON
EX9 1YJ
Form : 6B

Search

File: TEACHERS, search for:

Target Subset: Subset B

Description

Source Subset: All Cards

+ Plus
> Greater
(Bracket
Contains
- Minus
< Less than
) Bracket
Sounds like
x Times
= Equal
AND
SpaceStrip
÷ Divide
<> NOT Equal
OR
Uppercase
Filter
Clear
Combine
Cancel
OK
Subset
All Cards
NOT B
NOT C
NOT D
NOT H
NOT I
NOT J
NOT N
NOT O
NOT P
NOT T
NOT U
NOT V
NOT W
NOT X
NOT Y
:1
:0

Extensive search facilities

Product: Multistore
Price: £299.00
Requirements: Archimedes (with Risc OS)
Supplier: Minerva Software, 69 Sidwell Street, Exeter, Devon EX4 6PH.
Tel: 0392 437756

I CERTAINLY could not begin to administer my parish effectively without information handling tools, and at the rate my school governor responsibilities are increasing, I shall need more than a couple of files in a box very soon.

That is why I started using a BBC Micro as an aid to parish administration from 1984 – I think I was the first clergyman to convince the taxman that a micro was an allowable expense – and why I have now upgraded to an Archimedes.

I need three items of software to run a parish, and these are the same items that any business, whatever its size, needs – word processor, spreadsheet and database – and each of these utilities *must* have one thing in common, user-friendliness.

Life is too hectic for me to be able to spend long hours poring over impenetrable instruction manuals or trying to decipher enigmatic error messages. I must have a package up and running, albeit at the simplest level, in the minimum time and from then on have a fair idea how to access all the more sophisticated elements.

I honestly admit to wondering how I was going to cope when the **Multistore** package landed on my doorstep: Two discs and a printed manual of almost 200 pages stared up at me. Was it going to be too complicated for me to cope with?

Sophisticated database

A glance through the four page *Overview* leaflet suggested that Multistore was a very sophisticated database indeed, making full use of the Archimedes desktop environment, with full multi-tasking capabilities and the ability to link with other products such as Pipedream and First Word Plus.

The main manual is very well written, and great emphasis is placed on absolute clarity of expression: If you follow it through carefully, it is almost impossible to make a mistake. You are urged to spend time on the experimentation parts of the package as a valuable way of learning your way around the various elements and getting hints of the program's full possibilites.

After a section giving the background to databases and a glossary of terminology – invaluable to first-time users – you are encouraged to make back-up copies of the

Accurate information handling is a vital prerequisite for any enterprise, no matter what its size. Here Vicar Bob Redruth considers how modern technology helps his work, and sees if one of the latest database managers would meet the bill

two discs before starting serious work on the experimental section.

Installation of Multistore is carefully explained and the first example file that is recommended for experimenting with is a *Books* file containing a small library catalogue. The picture you see on your screen is divided into two sections: There is a *Browse* window and, attached to it, a *Tools* pane.

As you might expect, the Browse window contains the information and the Tools pane consists of a group of icons used to manipulate it. The layout of the Tools pane is deliberately designed to look like the controls of a video cassette recorder so that movement through the file becomes an easy matter, and the major search facility is a Fast Find Box – of which more later.

The Books file is about three-quarters full, so that an experiment which can be tried more than once is that of adding a new record. At the same time, since it contains well over 20 entries, plenty of practice is available for data manipulation – checking common factors, cross-references and the like – and watching the results of making calculations.

Two important concepts with this database manager are the *Index* and *Key* fields, and it is these which are utilised in the Fast Find facility and which need to be carefully considered when creating a new database. If too many fields are designated Key fields the whole object of the Fast Find is undermined.

The exercise given incorporates use of the name Nelson: Entering a minimum of the first three characters would call up all references to Nelson – or even Nellie – that occur in key or indexed fields. It is also possible to restrict the search to a designated field – such as the title of a book.

That facility is all very well when you are precisely sure of what you are looking for, but what about following up a vague hunch?

The Fast Find menu turns out to have a number of helpful facilities apart from the exact match one. The *Fuzzy* search can thus succeed even if there are no proper matches, and it is possible to instruct the search to examine the indices and the Key fields in various permutations.

If you can only remember the house number of an address, only character indices will be searched even though what is being sought is a numeric entry.

The indices have a particular use when browsing records, since a variety of options can be created allowing different sequences of the records. This is most useful in saving time on sorts (though two very powerful sort facilities are provided) in that as new entries are made the indices are automatically updated.

Key fields really come into their own on searches for random data; they can't be used to browse through files.

A more subtle search facility provided by Multistore is via filters and subsets. Using the library card example, it is possible to filter out the less popular books – in terms of borrowings – and browse through the remainder.

This could, for example, be translated into school use where the track record of individual teachers can be examined using as criteria the examination marks achieved by their pupils.

If ever teacher appraisal does come in then this and other tools are going to be essential, particularly if schools are going to be required to publish examination results.

Specialised items

SUBSETS are a useful tool for creating mini-files of items that refer to specialised items: The example given suggested all books whose subject field contained references to France. Since these are saved along with the main file, they are available for use at will and searches can be narrowed even further by applying a filter to the subset, and reports can be generated from either option.

Editing an existing record is carefully explained in straightforward language, and so is the process of adding a new record. One facility that impressed me is the fact that Multistore has the capability of adjusting the size of fields even when a database has been created.

In my life, Murphy's Law means that sooner or later an item of information crops up that is always one character more than the field I originally designed.

Various types of report can be generated, and either printed or saved as a file for use in another application. An interesting facility provided in the *Sheet* report is the way fields in a record card can be edited via the report – very useful if new information comes to your notice as you are preparing the report.

I mentioned at the beginning that Multistore is fully multi-tasking, and the experiment section of the manual provides one or two examples. Since I often generate quite long files of one kind or another which then need to be printed at once, the multi-tasking ability is an exceedingly valuable feature. I can get on with editing another file at the same time.

Being able to print the address labels for the parish Christmas card list and, at the same time, update our own personal list ready for printing, saves a great deal of time.

As well as being able to send data to Pipedream and First Word Plus, Multistore caters for View, Interword and Wordwise Plus, creating a valuable tool for mailshots of various kinds.

Multistore also has its own printer driver – the default settings apply to the Epson FX80 – and so generating printed matter should never be a problem but the output may not be as good as with the standard Acorn printer drivers.

The facility which fascinated me most was the support provided for macros. I suspect this is because, while I have been trained in formal logic, I only have O-level maths. Up to 30 lines of text are available, and these detail the various calculations that are performed when the macro is executed.

Depending on the ability of the user, these can range from simple calculations of VAT or turnover, to the use of quite complicated mathematical expressions which are quite beyond me.

Who is Multistore designed for? Well, at £299 it is outside the price range of the average home enthusiast, and is far more sophisticated than a home user needs. One category of user that comes vividly to mind lies in the field of education.

Many schools are facing the challenge of the new legislation whereby much of the day-to-day administration is devolved from local authorities to the schools themselves. They will need sophisticated tools to perform complex tasks, and if they have had the sense to equip with Archimedes machines they need look no further – especially since Multistore can operate on a network.

Another category of user that comes to mind is in medicine. General practitioners of medium size – three or four partners – would find the facilities offered by Multistore invaluable, particularly in they have to think of managing their practice budget.

These and other types of small-to-medium business where a micro is a useful tool, would do well to take a close look. I know it would help me to run my parish very efficiently.

Summing up

This is a well-documented and well-designed piece of software offering a wide range of facilities. At the price it's not designed for the average home user, but it will certainly aid larger institutions

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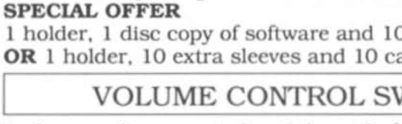

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ARMADEUS SOUND SAMPLING

Full-featured RISC OS multi-tasking application. Real time wave-form image display, sample editing (cut, reverse, echo, fade in/out, re-scale, looping etc), 128-point real time spectrum analysis, replay stereo effect, play samples via MIDI keyboard, sample up to 114 seconds on 1MB RAM, variable sample rate from 4KHz-76KHz, compatible with Armadeus sampler board, Armadillo A448, A448b (mono version), Wildvision ADC 1208, Unilab interface.

Software	£69.00
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Various models, from 8-bit mono up to 16-bit stereo including MIDI ports. Modular software construction (Voice set-up, Sampler, Object Manager, etc), powerful editing facilites (looping, delete, copy, move, insert, zero, reverse, fade-in/out, envelope shaping), replay via MIDI keyboard, sample mapping across keyboard, etc. Many more advanced, sophisticated and powerful features.

A448	8-bit sampler + software, mono	£126.00
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=AMPSOUND=

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◀ From Page 27

```
   10 REM STRAT1
   20 REM by Martin Sann
   30 REM (C) The Micro User
   40 MODE7
   50 VDU23;8202;0;0;0;
   60 p$=CHR$150+STRING$(39,"p")
   70 `$=CHR$150+STRING$(39,"`")
   80 cl$=STRING$(20," ")
   90 PROCname
  100 PROCinit
  110 CHAIN"strat2"
  120 :
  130 DEFPROCname
  140 PRINTTAB(0,0)`$
  150 FOR R%=0TO1
  160 PRINTTAB(6,R%+1)CHR$131+CHR$141+"S
  T .R  A  T  A  G  E  M"
  170 NEXT R%
  180 PRINTTAB(13,3)"FOR TWO PLAYERS"
  190 PRINTTAB(0,4)p$
  200 PRINTTAB(0,20)`$
  210 PRINTTAB(6,21)"TYPE IN NAME OF "
  220 PRINTTAB(10,22)"AND THEN PRESS RET
URN"
  230 PRINTTAB(0,23)p$;
  240 p1$=FNin("FIRST PLAYER")
  250 p2$=FNin("SECOND PLAYER")
  260 $&380=p1$
  270 $&38A=p2$
  280 ENDPROC
  290 :
  300 DEF FNin(m$)
  310 LOCAL a$,i$,g%,l%
  320 PRINTTAB(16,16)STRING$(8,CHR$255)
  330 PRINTTAB(22,21)m$
  340 REPEAT
  350 REPEAT g%=GET:a$=CHR$g%:l%=LENi$
  360 IF l%=0 AND g%=13:VDU7:GOTO340
  370 UNTIL g%=13 OR g%=127 OR (g%>64 AN
D g%<91)
  380 IF g%=13 OR g%=127 ELSE IF l%=8 EL
SE i$=i$+a$
  390 PRINTTAB(16,16)i$
  400 PROCs
  410 IF g%=127 IF i$>"" PRINTTAB(15+l%,
16)CHR$255:i$=LEFT$(i$,l%-1)
  420 UNTIL g%=13 AND l%>0
  430 =i$
  440 :
  450 DEFPROCs
  460 SOUND1,-10,180,2
  470 ENDPROC
  480 :
  490 DEFPROCinit
  500 ?&368=&13
  510 VDU23,48,28,34,65,65,65,65,34,28
  520 VDU23,49,8,24,8,8,8,8,8,8
  530 VDU23,50,126,1,1,62,64,64,64,127
  540 VDU23,51,62,1,1,14,1,1,1,62
  550 VDU23,52,2,6,10,18,34,127,2,2
  560 VDU23,53,127,64,64,126,1,1,65,62
  570 VDU23,54,62,64,64,126,65,65,65,62
  580 VDU23,55,127,66,4,8,16,32,32,32
  590 VDU23,56,62,65,65,62,65,65,65,62
  600 VDU23,57,62,65,65,63,1,1,1,62
  610 VDU23,224,1,3,7,15,31,63,127,255
  620 VDU23,225,128,192,224,240,248,252,
254,255
  630 VDU23,226,255,128,159,159,159,159,
128,255
  640 VDU23,227,255,1,249,249,249,249,1,
255
  650 VDU23,228,0,255,0,255,0,255,0,255
  660 VDU23,229,0,0,3,6,6,6,3,0
  670 VDU23,230,0,0,198,103,102,102,198,
0
  680 VDU23,231,0,0,192,96,0,0,0,0
  690 ENDPROC
```

Get it right!

```
 10 =    0 0        360 = 201C 5
 20 =    0 0        370 = 3A70 1
 30 =    0 0        380 = D201 6
 40 = 8AFC C        390 = A35A B
 50 = F716 F        400 = 3B57 9
 60 = 88DC A        410 = 9DAD 0
 70 = E8B5 1        420 = 92B4 8
 80 = 8D7E 0        430 = 52A0 8
 90 = 6D73 A        440 = 9719 5
100 = DEBB F        450 = 1C92 B
110 = FC52 8        460 = B414 F
120 = 9719 4        470 = ED0F B
130 = 8784 F        480 = 9719 9
140 = A588 D        490 = 344C E
150 = 6791 A        500 = ABC9 D
160 = 1895 A        510 =  ADF 8
170 = 27B0 3        520 = 2B40 F
180 = 9C3A 8        530 = 5B49 3
190 = 6C0A 3        540 = 525F 6
200 = E7CE 3        550 = 6EA8 E
210 = 8AEF B        560 = B826 2
220 =  4F1 0        570 = 6F0C C
230 = 6940 6        580 = 9B0E 3
240 = 8D0F 1        590 = E8DE E
250 = 40BD C        600 = C05E 3
260 = F0BA D        610 = 1F98 2
270 = 123E D        620 = 23A5 C
280 = ED0F 0        630 = 51CA 3
290 = 9719 E        640 = 48A6 9
300 = 4757 3        650 = BDEE 3
310 = E458 8        660 = 241F C
320 = 5899 5        670 = 9C9D 9
330 = D9D2 9        680 = 1B79 1
340 = BFBA 5        690 = ED0F B
350 = 96A6 0
```

```
   10 REM STRAT2
   20 REM by Martin Sann
   30 REM (c) The Micro User
   40 MODE4:VDU23;8202;0;0;0;
   50 VDU19,0,4;0;
   60 DIM prod%(36),comp%(36),d%(36)
   70 DIM good$(8)
   80 *FX4 1
   90 *FX11 0
  100 ENVELOPE1,10,16,-16,0,8,1,20,-128,
0,0,-10,128,128
  110 ws$="Wins    Score    "
  120 i1$=CHR$224+CHR$225:i2$=CHR$226+CH
R$227:cl$=STRING$(36," ")
  130 w1%=0:w2%=0:p1$=$&380:p2$=$&38A
  140 PROCchoose:PROCscreen:PROCchange
  150 PROCend:END
  160 DEFPROCchoose
  170 sc1%=0:sc2%=0:f%=1:s%=1
  180 end%=0:tm1%=20
  190 PROCfill
  200 PROCd("Choose level",14,12)
  210 PRINTTAB(15,17)"1  =  easy"
  220 PRINTTAB(15,19)"2  =  hard"
  230 REPEAT:level%=GET-48:UNTIL level%>
0 AND level%<3
  240 PROCd("Choose bonus",14,12)
  250 PRINTTAB(15,15)"0  =  none"
  260 PRINTTAB(15,17)"1  =  line"
  270 PRINTTAB(15,19)"2  =  time"
  280 PRINTTAB(15,21)"3  =  both"
  290 REPEAT:game%=GET-48:UNTIL game%>-1
 AND game%<4
  300 ENDPROC
  310 DEFPROCfill
  320 PROCbox(0,0,1279,1023)
  330 PROCbox(408,248,864,712)
  340 GCOL0,129:VDU24,416;256;856;704;:C
LG:VDU26:?&D3=255
  350 ENDPROC
  360 DEFPROCscreen
  370 CLS:COLOUR1:RESTORE 2200:PROCread
  380 GCOL0,129:VDU24,16;472;576;1007;
  390 CLG:VDU26
  400 GCOL0,0:PROCbox(24,480,568,999)
  410 GCOL0,1:PROCbox(592,746,1264,1007)
  420 PROCbox(592,472,1264,732)
  430 PROCbox(16,16,1264,384)
  440 PROCd(p1$,20,2):PROCd(p2$,20,10)
  450 PROCd(i1$,36,2):PROCd(i2$,36,10)
  460 w1$=STR$(w1%):w2$=STR$(w2%)
  470 PRINTTAB(20,6)ws$
  480 PRINTTAB(20,14)ws$
  490 PRINTTAB(25,6)w1$
  500 PRINTTAB(25,14)w2$
  510 PRINTTAB(37,6)"0"
  520 PRINTTAB(37,14)"0"
  530 PROCd("1",28,23):PROCd("1",32,23)
  540 PROCd("x";30,23):PROCd("=",34,23)
  550 PRINTTAB(6,27)"Change digits using
  Z and C"
  560 PRINTTAB(9,29)"RETURN  for the ans
wer":PROCscram
  570 IF game%>1 PROCtbox
  580 ENDPROC
  590 DEFPROCtbox
  600 PROCbox(16,396,34*32+4,460)
  610 PROCbox(35*32-16,396,1264,460)
  620 PRINTTAB(2,18)"Time bonus"
  630 ENDPROC
  640 DEFPROCread
  650 FOR n%=1TO35:READ prod%(n%):NEXT
  660 FOR n%=1TO8:READ good$(n%):NEXT
  670 ENDPROC
  680 DEFPROCbox(x1,y1,x2,y2)
  690 MOVEx1,y1:DRAWx1,y2:DRAWx2,y2:DRAW
x2,y1:DRAWx1,y1
  700 ENDPROC
  710 DEFPROCscram
  720 IF level%=1 high%=22 ELSE high%=35
  730 PROCrnd(high%):Ypos=0
  740 FOR n%=1TO16:Xpos=n% MOD 4
  750 IF Xpos=0 Xpos=4
  760 IF Xpos=1 Ypos=Ypos+2
  770 n$=STR$(prod%(comp%(n%))):?&D3=255
  780 IF LENn$<2 x%=-1 ELSE x%=-2
  790 PROCd(n$,Xpos*4+x%,Ypos*2-2)
  800 SOUND1,-12,0,1:NEXT n%:?&D3=0
  810 ENDPROC
  820 DEFPROCrnd(t%)
  830 Z=RND(-TIME)
  840 FOR n%=1 TO t%+1:d%(n%)=n%:NEXT
  850 REPEAT:r%=RND(t%):comp%(t%)=d%(r%)
  860 FOR n%=r% TO t%-1:d%(n%)=d%(n%+1)
  870 NEXT:t%=t%-1:UNTIL t%=1
  880 comp%(1)=d%(1)
  890 ENDPROC
  900 DEFPROCd(A$,x%,y%)
  910 X%=0:Y%=13:A%=10:D=&D00:M%=0
  920 C$=CHR$240+CHR$8+CHR$10+CHR$241
  930 REPEAT:M%=M%+1:B$=MID$(A$,M%,1)
  940 ?D=ASC(B$):CALL&FFF1
  950 VDU23,240,D?1,D?1,D?2,D?2,D?3,D?3,
D?4,D?4
  960 VDU23,241,D?5,D?5,D?6,D?6,D?7,D?7,
D?8,D?8
  970 PRINTTAB(x%+M%-1,y%)C$
  980 UNTIL M%>LENA$-1
  990 ENDPROC
 1000 DEFPROCchange
 1010 go%=RND(2):ok%=0:nok%=1:e1%=0:e2%=
0
 1020 REPEAT:go%=go%+1:pl%=go%MOD2
 1030 PROCp:PROCc:PRINTTAB(2,23)"Your go
"
```

➤

➤

```
 1040 PROCd(p$,10,23):PROCd(i$,36,23)
 1050 IF game%>1 PRINTTAB(13,18)STRING$(
20,CHR$228)
 1060 tm%=21000:IF game%=1 tm1%=0
 1070 IF tm1%>10 dec%=40 ELSE dec%=20
 1080 PROCkeys:PROCcheck
 1090 IF ok%<15 I=INKEY(200)
 1100 UNTIL ok%=15:I=INKEY(200):n%=0
 1110 REPEAT:n%=n%+1:a%=prod%(comp%(n%))
 1120 IF a%>0 end%=1:PROCok:ENDPROC
 1130 UNTIL n%=16
 1140 ENDPROC
 1150 DEFPROCp
 1160 IF pl%=1 p$=p1$:i$=i1$ ELSE p$=p2$
:i$=i2$
 1170 ENDPROC
 1180 DEFPROCc
 1190 PROCd(STRING$(20," "),2,23)
 1200 ENDPROC
 1210 DEFPROCkeys
 1220 IF nok%=1 or$="and" ELSE or$=CHR$2
29+CHR$230+CHR$231:COLOUR1
 1230 PRINTTAB(29,27)"   "
 1240 PRINTTAB(29,27)or$
 1250 k%=0:j%=2:REPEAT
 1260 REPEAT:*FX15
 1270 IF game%>1 PROCtimer
 1280 UNTIL INKEY(-98) OR INKEY(-83) OR
INKEY(-74)
 1290 IF INKEY(-98) k%=90
 1300 IF INKEY(-83) k%=67
 1310 IF INKEY(-74) k%=13
 1320 IF j%=1 AND nok%=0 GOTO1350
 1330 IF k%=90 j%=0:f%=f%+1:PROCpeep:IF
f%>9 f%=1
 1340 IF j%=0 AND nok%=0 GOTO1360
 1350 IF k%=67 j%=1:s%=s%+1:PROCpeep:IF
s%>9 s%=1
 1360 f$=STR$(f%):s$=STR$(s%)
 1370 PROCd(f$,28,23):PROCd(s$,32,23)
 1380 UNTIL k%=13:PROCd(" ",36,23)
 1390 ans%=f%*s%:ans$=STR$(ans%)
 1400 PROCd(ans$,38-LEN(ans$),23)
 1410 ENDPROC
 1420 DEFPROCtimer
 1430 tm%=tm%-dec%:tm1%=INT(tm%/1000)
 1440 IF tm1%<0 tm1%=0:ENDPROC
 1450 IF tm1%<10 tm$=" "+STR$(tm1%) ELSE
 tm$=STR$(tm1%)
 1460 COLOUR1:PRINTTAB(36,18)tm$:COLOUR0
 1470 PRINTTAB(13+tm1%,18)CHR$228:COLOUR
1
 1480 COLOUR1
 1490 ENDPROC
 1500 DEFPROCpeep
 1510 SOUND1,-10,180,2
 1520 ENDPROC
 1530 DEFPROCcheck
 1540 n%=0:REPEAT:n%=n%+1
 1550 tot%=prod%(comp%(n%))
 1560 UNTIL ans%=tot% OR n%=16
 1570 IF ans%=tot% PROCok ELSE PROCnok
 1580 ENDPROC
 1590 DEFPROCok
 1600 *FX15 0
 1610 ok%=ok%+1:nok%=0:PROCc
 1620 Xpos=(n% MOD 4)*4-2
 1630 IF Xpos=-2 Xpos=14
 1640 Ypos=2+((n%-1)DIV 4)*4:PROCp
 1650 IF end%=0 PROCd(good$(RND(8)),2,23
) ELSE PRINTTAB(2,23)"Yours":pl%=pl%+1:P
ROCp:PROCd(p$,8,23):I=INKEY(200)
 1660 ?&D3=255:PROCd(i$,Xpos,Ypos):?&D3=
0:SOUND1,1,4*(ok%+1),2
 1670 IF pl%=1 sc1%=sc1%+ans%+tm1%:prod%
(comp%(n%))=-1:PROCps(sc1%,6) ELSE sc2%=
sc2%+ans%+tm1%:prod%(comp%(n%))=-2:PROCp
s(sc2%,14)
 1680 ENDPROC
 1690 DEFPROCnok
 1700 *FX15 0
 1710 nok%=1:tm1%=0:PROCc
 1720 PRINTTAB(2,23)"Not in":PROCd("Squa
re",9,23):SOUND0,1,5,6
 1730 IF pl%=1 sc2%=sc2%+25:PROCps(sc2%,
14) ELSE sc1%=sc1%+25:PROCps(sc1%,6)
 1740 ENDPROC
 1750 DEFPROCps(sc%,y%)
 1760 sc$=STR$(sc%)
 1770 PRINTTAB(38-LEN(sc$),y%)sc$
 1780 ENDPROC
 1790 DEFPROCend
 1800 IF game%=1 OR game%=3 PROClbonus E
LSE PROCclear
 1810 IF sc1%>sc2% w1%=w1%+1 ELSE w2%=w2
%+1:w1$=STR$(w1%):w2$=STR$(w2%)
 1820 PRINTTAB(25,6)w1$
 1830 PRINTTAB(25,14)w2$
 1840 PRINTTAB(4,28)"Do you want to play
 again (Y/N)?"
 1850 REPEAT:G$=GET$:UNTIL INSTR("YN",G$
)
 1860 IF G$="Y" PROCclear:PRINTTAB(3,28)
"Do you want the same bonus (Y/N)?" ELSE
 END
 1870 REPEAT:G$=GET$:UNTIL INSTR("YN",G$
)
 1880 IF G$="Y" GOTO150 ELSE CLS:GOTO140
 1890 ENDPROC
 1900 DEFPROClbonus
 1910 PROCclear
 1920 PROCd("Line bonus",4,23)
 1930 PRINTTAB(20,22)p1$
 1940 PRINTTAB(20,25)p2$
 1950 PROCline(1,4):PROCline(4,1)
 1960 ENDPROC
 1970 DEFPROCclear
 1980 FOR R%=1TO9:PRINTTAB(2,20+R%)cl$:N
EXT R%:ENDPROC
 1990 DEFPROCline(F%,G%)
 2000 FOR H%=0TO3:L%=H%*G%+1
 2010 lv%=prod%(comp%(L%))+prod%(comp%(L
%+1*F%))+prod%(comp%(L%+2*F%))+prod%(com
p%(L%+3*F%))
 2020 FOR V%=0TO3
 2030 v%=lv%-prod%(comp%(L%+V%*(5-G%)))
 2040 IF v%=-3 e2%=e2%+1:PROCe1
 2050 IF v%=-6 e1%=e1%+1:PROCe2
 2060 NEXT V%:NEXT H%
 2070 ENDPROC
 2080 DEFPROCe1
 2090 sc2%=sc2%+50:sc2$=STR$(sc2%)
 2100 e2$=STR$(e2%*50)
 2110 PRINTTAB(38-LEN(sc2$),14)sc2$
 2120 PRINTTAB(38-LEN(e2$),25)e2$
 2130 ENDPROC
 2140 DEFPROCe2
 2150 sc1%=sc1%+50:sc1$=STR$(sc1%)
 2160 e1$=STR$(e1%*50)
 2170 PRINTTAB(38-LEN(sc1$),6)sc1$
 2180 PRINTTAB(38-LEN(e1$),22)e1$
 2190 ENDPROC
 2200 DATA 1,2,3,4,5,6,7,8,9,10
 2210 DATA 12,14,16,18,20,21,24
 2220 DATA 25,27,28,30,32,35,36
 2230 DATA 40,42,45,48,49,54,56
 2240 DATA 63,64,72,81
 2250 DATA Good one!,Well done!,Fine!,Se
hr Gut!,Wunderbah!,Muy bien!,Excellente!
,Bueno!
```

All program listings in this issue are among the hundreds available for downloading FREE on

MicroLink

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = BA2D D
  50 = 3809 8
  60 = 78B7 C
  70 =  E8D F
  80 = A6EE 0
  90 = F52B 5
 100 = 2435 B
 110 = 81A8 7
 120 = E192 1
 130 = 19DC 1
 140 = C3FD 3
 150 = 8B24 4
 160 = FE9C 2
 170 = 7DF8 9
 180 = F367 8
 190 = E309 5
 200 = 7910 9
 210 = 2DA9 1
 220 = D63A 3
 230 = 9B95 6
 240 = 48EC 4
 250 =  AAB A
 260 = 473A 7
 270 = 80EB D
 280 = 1504 9
 290 = 502A 1
 300 = EDOF F
 310 =  9FE 4
 320 = 2333 A
 330 = 5AE8 5
 340 = 9B0D 7
 350 = EDOF F

 360 = F5B9 4
 370 = B235 8
 380 = 15C5 F
 390 = 8C6C 0
 400 = EA28 0
 410 = 6343 B
 420 = 70F3 3
 430 = 2E25 7
 440 = 4769 5
 450 = ED69 E
 460 = D6E9 8
 470 = CBE0 9
 480 = 9D29 2
 490 = D9E9 6
 500 = EB6A C
 510 = 1810 0
 520 = 3C75 9
 530 = A5F4 8
 540 = C404 3
 550 = CF06 1
 560 = CAF4 6
 570 = 79F2 F
 580 = EDOF D
 590 =  826 8
 600 =  E57 8
 610 = 82BA D
 620 = 33AF 4
 630 = EDOF 9
 640 = 5A9D A
 650 = 9FBA 0
 660 = 707D D
 670 = EDOF A
 680 = 9113 B
 690 = F82B D

 700 = EDOF 8
 710 = B3BA F
 720 =  3EB 8
 730 = F424 9
 740 = E596 A
 750 = 253A 4
 760 = 3E3F 7
 770 = 3710 7
 780 = 9F1B E
 790 = CF4C 1
 800 = 8C6B 2
 810 = EDOF 8
 820 = 7E73 C
 830 = 5071 1
 840 = 6AC6 F
 850 = 11B6 0
 860 = 7016 9
 870 = CAA8 6
 880 = 779F 8
 890 = EDOF C
 900 = BBE7 E
 910 = 3954 F
 920 = 35A1 7
 930 = 82BF 1
 940 = 2305 7
 950 = 278F C
 960 = A88F D
 970 = F132 5
 980 = 9A46 A
 990 = EDOF A
1000 = A441 3
1010 = C948 D
1020 = B6C5 3
1030 = 2B2E 8
1040 = A56A B
1050 = AFF0 8
1060 = 6092 0
1070 = C436 6
1080 = EC36 1

1090 = BB04 A
1100 = 62BD 7
1110 = D24C 5
1120 = 665F 0
1130 = 4A20 0
1140 = EDOF 0
1150 = 2CF1 9
1160 = 50FF 8
1170 = EDOF 6
1180 =  EA3 2
1190 = FA74 7
1200 = EDOF D
1210 = 5A41 6
1220 = 3C83 E
1230 = E881 4
1240 = 3DE1 0
1250 = 903F F
1260 = 5F93 4
1270 = 463B C
1280 = 8F48 B
1290 = A4F5 9
1300 = F9A0 4
1310 = 7FFF 2
1320 = 1317 9
1330 = 53F8 B
1340 = 12E6 8
1350 = CBF0 0
1360 = 7E1B 8
1370 = D2D2 6
1380 = 8810 6
1390 = 5A11 A
1400 = 3B1F 2
1410 = EDOF 5
1420 = FC8D 5
1430 = DA28 7
1440 = 513C 3
1450 = 23FC F
1460 = F33F E
1470 = DFBD B

1480 = E949 B
1490 = EDOF F
1500 = 2984 A
1510 = B414 A
1520 = EDOF 1
1530 = 69A8 F
1540 = B5E4 5
1550 = 37E6 E
1560 = 1E35 6
1570 = 275D 1
1580 = EDOF C
1590 = DA6E 3
1600 = 29EB 6
1610 = 87CE 7
1620 =  B10 5
1630 = F661 E
1640 = D663 9
1650 = 89AA D
1660 = D47F E
1670 = 8F46 C
1680 = EDOF 2
1690 = 220E 3
1700 = 29EB 3
1710 = 4D0C 5
1720 = 4BDD 8
1730 = E629 5
1740 = EDOF 9
1750 = 6FDA A
1760 = 512E 2
1770 = D260 5
1780 = EDOF 4
1790 = 1021 E
1800 = 9752 0
1810 = C5AD 9
1820 = D9E9 E
1830 = EB6A B
1840 = C07B E
1850 = 80F1 0
1860 = 1F7C 4

1870 = 80F1 B
1880 =  BDC 4
1890 = EDOF 7
1900 = 9250 C
1910 = ED47 F
1920 = 4CE9 D
1930 = 7072 B
1940 = 42F5 6
1950 = 7BAA E
1960 = EDOF 0
1970 = 4623 0
1980 = 66DA A
1990 = 3AD0 B
2000 = 16E7 3
2010 = D567 4
2020 = 4172 F
2030 = 3228 B
2040 = 2F05 9
2050 = E7C2 9
2060 = DE3F E
2070 = EDOF 6
2080 = CE1A 1
2090 = 239D 4
2100 = 9A90 F
2110 = B26A A
2120 = 9EC5 5
2130 = EDOF 0
2140 = FE79 E
2150 = 646D B
2160 = 51EF 9
2170 = 1460 3
2180 = 1D8D 1
2190 = EDOF 6
2200 = C2AA 5
2210 = 341C 7
2220 = 3E34 B
2230 = E181 E
2240 =  A7D E
2250 = 131D 8
```

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Looping again

£10 Prize letter

SINCE reading the letter by Grimble Gromble in the August issue of The Micro User *I have come up with a few more thoughts about loop structures.*

Although FOR...NEXT loops may have more than one exit, this is not without its dangers, as the following shows:

```
   10 INPUT N%
   20 FOR J%=1 TO N%
   30 IF J%=3 THEN PRINT "Thr
ee":NEXT
   40 NEXT
```

This will work for all positive values of N% *except three, when it will stop with a NEXT without FOR at line 40.*

The solution is either to ensure that the condition is never true on the last iteration, or make the alternative explicit – for example delete line 40 and change line 30 to read:

```
   30 IF J%=3 THEN PRINT"Thr
ee":NEXT ELSE NEXT
```

This should work correctly for all positive values. The easiest way to simulate a WHILE loop on a BBC Micro is probably as follows:

```
IF NOT cond THEN REPEAT c
ode:UNTIL cond
```

If the code is of any complexity it is best placed in a procedure but calling it repeatedly in a long loop is a recipe for a program which runs slower than the Central line during the rush hour. The solution is to place the REPEAT in the procedure, which also provides an easy way of eliminating GOTOs – by replacing them with ENDPROC instead:

```
   10 IF NOT cond THEN PROCr
pt
   20 .....
  980 .....
  990 END

1000 DEFPROCrpt
1010 code
.....
.....
2000 IF loop cond THEN UNTI
L FALSE
2100 IF break cond THEN UNT
IL TRUE:ENDPROC
2110 code
.....
.....
3000 UNTIL cond:ENDPROC
```

It also makes it simple to incorporate the LOOP and BREAK options without the use of GOTO, or other obscure costructs.

If it is intended to jump out of a FOR...NEXT loop it is often better – albeit slower – to code it explicitly as a REPEAT loop:

```
10 index=exp1
20 REPEAT
30 code
40 index=index+step
50 UNTIL cond OR index>exp2
```

If cond involves the use of index to access an array, the loop will have to be rewritten like this:

```
10 index=exp1-step
20 REPEAT
30 index=index+step
40 code
50 UNTIL cond OR index=exp2
```

Having said all that there are times when GOTO is the simplest logical solution.

Consider the following piece of pseudo-code which occured in one of my programs.

Note that process means print double-height in a certain colour:

☐ *Get and process first valid keypress.*

☐ *Get second valid keypress. If Delete go back one step else process.*

☐ *Get third valid keypress. If Delete go back one step. If Return then exit.*

A quick flowchart will show two overlapping loops – difficult to program using the ordinary loop construct without using devious methods such as flag variables.

Here it is GOTO which provides the simplest solution. It may occasionally have its uses, as even PASCAL has to acknowledge and it is the excessive use of it that structured programmers object to so strenuously. – **Phil Bender, Romford.**

An educational disaster ?

IN the letter published in the January issue, Ursula Daniels loyally supports the party line – cross-curriculum IT and the national curriculum are good, CAL is bad, micros are expensive and so on. She would also probably buy a second-hand car from Ken Baker.

I believe that the national curriculum is an educational disaster. It concentrates on testing children, teachers and schools, but says little about what should be done when children are shown, by the tests, to be falling behind. Yet this is the very heart of the matter.

There is not the slightest chance of the present government particularly – or any other probably – providing enough money for enough teachers to give the amount of individual tuition which will enable all children to reach their full potential.

At present even the best school education only scratches the surface of the potential of most children, and the least able go to the wall.

The only economically feasible way of providing enough individual tuition for all children to reach their full potential is by the use of micros.

Compared with the use of human teachers, they are extremely cheap as providers of that individually tailored interactive tuition which is the key to educational success.

Of course, it would need an initial major expenditure on developing the software. Perhaps 0.1per cent of the money being thrown away on Trident? – **Leslie Duffen, New Abbot, Devon.**

Win a tenner

WANT to write to The Micro User? The address is: Letters, The Micro User, Europa House, Adlington Park, Adlington, Macclesfield, SK10 4NP.

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Rescaled scales

WHEN I bought the Scanlight by Computer Concepts I understood that the printed vertical scale would be 10 per cent longer than that with a dot matrix printer. I thought that there may be a remedy for this, but did not realise at first how simple it was:

☐ *Scan the original and print at 100 per cent.*

☐ *Turn the resulting print around by ninety degrees and scan again.*

☐ *Print at 91 percent (or 184 per cent for double scale).*

The resultant printout will now be proportionally correct. I was amazed that this had not been mentioned anywhere before seeing as it is so straightforward. – **D.G. Shingles, Norfolk.**

It's only an opinion

I READ your review of The Fourth Dimension's new game UIM in your November 1989 issue. It looked good so I bought it but it should be renamed BIN, after the place where I put it.

I don't think the person who wrote the report had really played the game for very long. Playability should read zero not 10, and it is not a replacement for Elite. I and a few others have given up in mission two out of the 256.

On trying to get into any Red station, after re-entry you are instantly set upon by a minimum of two bandits, the keyboard virtually freezes up and you are left with an end of game message within five seconds.

Not just once or twice but up to four hours worth of trying

➤

Removing those unwanted records

THE problem I.S. Crawford had with ViewStore – Mike Cook's Problem Solved, December 1989 – is quite easily solved by creating a new database in place of the old one. This will leave behind all the deleted records. To do this use the Convert utility outlined in chapter 5 of the manual. First enter:

```
U CONVERT
```

Then at the prompt Use select file? (Y/N) *just press Return. To the prompt* Field 1? *simply reply.* *

Then at the prompt Field 2? *press Return and you will then be prompted for a size. Here you can again just press Return to give the default of +20 characters.*

Finally you will be asked for a filename for the new database and this will be save to directory D as usual.

I use the short EXEC file shown for my DFS ViewStore discs to automatically re-create my database, which I usually call ALPHA with an extra 50 characters per record. This can be EXECed when needed.

It also removes any deleted records and compacts the disc, making sure that the database file is first on the disc, thus avoiding Can't extend *errors for subsequent entries.*

It is wise to have a backup copy just in case something goes wrong in mid-process. One possibility for catastrophe is that there might not be room in the catalogue for a new file but the old one is deleted just the same.

Conversion can take quite a while but it is a process which is only rarely required. – **John R. Williams, Birkenhead, Merseyside.**

```
LO ALPHA
U CONVERT
N
*

            ( a blank line )
+50
BETA
LO BETA ALPHA
U INDEX
N
*
*DEL. D. ALPHA
*COMPACT
*RENAME D. BETA D. ALPHA
LO ALPHA
```

The View Store EXEC File

➤

to get into one station. Value for money should be zero not ten.

Perhaps you should replay the game. – **John Salt, Rafford by Forres, Morayshire.**

● Reviews are always a matter of opinion – games some people love, others hate and maneouvres one player may find easy, could be impossible to another. Our reviewer certainly liked UIM. We'd be interested to hear what other people think about and other games that are available for the BBC Micro.

No Risk on a BBC Micro

I OWN a BBC B and have been looking for an equivalent of the board game Risk for some considerable time. I have asked at all the local shops and scoured the adverts in your magazine – all to no avail. Is there one? – **K. H. Brook, Epworth, Doncaster.**

● A version of Risk is soon to be released for some machines, but unfortunately not the BBC Micro. If any readers know of any existing similar games, plese let us know.

Failed substitution

I typed in the Snowman's Revenge from the January issue of The Micro User *but I couldn't get the checksums for line 120 to match. Can you please help?* – **C. M. Jongerius, The Netherlands.**

● Like all our listings, the one you mention was taken from the working program and passed straight to DTP software for typesetting. Unfortunately, due to a feature of the package used, > couldn't be sent directly from the BBC Micro, so YY was substituted in its place before the transfer.

But in Snowman's Revenge there was a real Yy in line 210 and the global replace to change all the substitute ones back altered that as well.

So if you change the *>Nn* in line 210 to *YyNn* the checksums match and the program works.

For the same reason a few errors have crept in to February's **Golf** game and designer. In the former, everywhere that a <X occurs it should be replaced with x<. So lines 920, 1120, 1150 and 1690 need altering.

Similarly, lines 940 and 1690 need the >Y changing to y>. In the designer program the changes are to lines 680 and 710. In the former, replace <X with X< and in the latter the >Y should be Y>.

We apologise for these mistakes – teething trouble as we moved to a new typesetting system.

Now we're aware of it we will endeavour to make sure it doesn't happen again.

No flashing please

I HAVE a BBC B+ and would like to stop the cursor flashing while still keeping it on the screen.

I know how to switch it off completely – this is documented in several places including the User Guide – but cannot find any simple way to stop it blinking. – **Dr. IR Shand, Derby.**

● You need a short interrupt driven machine code program like the one shown on the right. This generates a file which is saved under the filename NoFlash, and to use it from disc simply type *NoFlash or *RUN NoFlash from tape.

By removing the last two lines you can use the routine from inside your own programs directly. All you need to do is CALL &900 to initiate it.

```
   10 REM Stop cursor from f
lashing but
   20 REM keep it on screen.
   30 REM (c) The Micro User
   40 FOR pass=0 TO 3 STEP 3
   50 P%=&900:[OPT pass:SEI
   60 LDA &220:STA old+1
   70 LDA &221:STA old+2
   80 LDA #code MOD 256:STA
 &220
   90 LDA #code DIV 256:STA
 &221
  100 CLI:LDA #14:LDX #4:JMP
 &FFF4
  110 .code CMP #4:BNE old
  120 PHP:PHA:TXA:PHA:TYA:PH
A
  130 LDX #10:LDY #15:JSR do
:INX:INY
  140 JSR do:PLA:TAY:PLA:TAX
:PLA:PLP
  150 .old JMP &0000:.do STX
 &FE00
  160 STY &FE01:RTS:]:NEXT
  170 $&700="SAVE NoFlash 90
0 "+STR$~P%
  180 X%=0:Y%=7:CALL &FFF7
```

One word of warning: Do not re-run the code once you have a steady cursor or the micro will crash.

To keep the code as short as possible, there's no check whether the vector has already been changed to point to the routine has been included.

This will run on any B, B+, Master or Compact, but for owners of the last two or one of the Archimedes series a simpler alternative is to use:

```
VDU 23,1,2;0;0;0;
```

– **S.Wade, Poynton, Cheshire.**

ALL programs printed in this magazine are exact reproduction of listings taken from running programs which have been thoroughly tested.

However, on the rare occasions when mistakes occur corrections are published as a matter of urgency. Should you encounter error messages when you type in a program, they will almost certainly be the result of your own typing mistakes.

Unfortunately we cannot answer personal programming queries concerning these mistakes. Of course letters about suggested errors will be investigated without delay, but any replies found necessary will only appear in the letters pages.

Coloured warning

I READ with interest D.N. Edwards' problem in the November 1989 issue of The Micro User *concerning my Caption program and I'm sure many readers will be grateful for your colour background modification.*

However, I think it is only fair to warn anyone who spends time and effort on their videos that a background colour for their captions will often produce disappointing results because it is supposed to appear as a square in the centre of the screen and is often distorted when displayed on an ordinary domestic television.

It may be that one of the background edges disappears off the side of the screen and makes everything look off centre or, worse still, all four sides of the background can collapse or bulge on a badly-aligned monitor. This leaves what looks like an odd sort of pin cushion in the centre of the screen.

Colours, too, can be distorted, especially if there is a strong magnetic field near the screen.

A hi-fi speaker, for example, can cause ugly red and yellow patches to appear on a blue background.

These effects do nothing to enhance a video production and often give rise to embarrassing rather than professional results. – **John Dewar, Great Barr, Birmingham.**

ADU Bad maps

I READ the review of Pineapple's ADU ROM in the November 1989 issue of The Micro User *with great interest after having had the software installed for the best part of a year.*

I found it to be of great use, especially having the formatting, verifying and backup commands available without having to swop discs.

I have just one comment to make: I have the rom installed in a BBC B+ 128 and often need to use the disc sector editor.

The manual states that the free space map checksum is automatically re-calculated when the editor is used, but when I use it to recover deleted files then try to remove the file again – having saved it elsewhere on the disc – I constantly get the error Bad FS map.

*When I try entering *DIRDESTROY or *DESTROY, all files up to the edited one are deleted, then the above error is reported.*

The only way I've managed to resolve this is to re-erase the file using the editor which is tedious as I have to reorganise the directory catalogue by hand.

Have you any suggestions as to how I can get around this? – **Mike Whiteman, Lewisham, London.**

● We haven't encountered this fault ourselves. Have any readers had a similar problem and found a solution?

Variable transfer

I AM writing a long adventure game on my BBC Micro and I need to transfer SC *– the score – from one program to another. At the same time I also need to copy over the inventory contained in* INV$. *Is there an easy way to do this?* – **Andrew Snoograss, Troon, Ayr, Scotland.**

● Transferring integer values is easy – the variables *A%* to *Z%* are not affected when you change programs so just have:

```
S%=SC
```

Before you exit the first program and:

```
SC=S%
```

as you enter the second.

Copying strings is harder, as you need to find an area of memory that won't be altered as the new program is loaded and run.

However Basic itself only uses the memory from &700 to &7FF for input – either in direct mode or INPUT statements. So that you can use this include the line:

```
$&700=INV$
```

Just before you leave the first program and:

```
INV$=$&700
```

At the start of the second.

£10 *Prize letter*

Micro reproduction

IN James Gleick's book Chaos, he mentions a formula called the logistic difference equation. This could be used to model the rise and fall of an animal population between 0 – extinction – and 1 the maximum possible.

To find the next year's population from the current year's use the following function:

New population=(Current Population)*(1-Current Population)*R

or

$$P_{next}=P_{current}*(1-P_{current})*R$$

P represents population and the number represented by R *is the reproduction rate.*

Different animals will have different values of R, and this is where the interest comes in – note that values greater than 4 will cause the system to break down, since the population could rise above 1.

Some values, like 2, will settle down into a straight line, while others will continue to oscillate. Changing the starting value of P *will also affect the shape of the graph.*

The BBC Micro program shown was inspired by this formula and produces a graph that charts the population year by year.

There are two versions of the routine: Listing I charts the first 20 years on a single screen and Listing II charts the situation yearly, scrolling along the screen to allow the calculation to continue indefinitely. Unfortunately this is much slower, because it uses the rectangle move PLOT code – 189 – and only works the Master, Compact or Archimedes series.

When run, the program will ask you for the reproduction rate – R. *There is no option to change the starting population but this is easily accomplished by editing the appropriate line of the program.*

With Listing I the micro will pause after drawing the graph – to continue press the spacebar. Listing II wil continue until the spacebar is pressed to stop it. – **Terry Boon, St. Albans, Herts.**

ListingI

```
   10 REM LISTING I
   20 REM For all models
   30 MODE 0
   40 MOVE 1100,100
   50 DRAW 50,100
   60 DRAW 50,850
   70 DRAW 1100,850
   80 INPUT "Reproduction ra
te : "R
   90 population=0.5
  100 MOVE 50,(population*75
0)+100
  110 FOR year%=1 TO 20
  120 population=(1-popula
tion)*population*R
  130 DRAW(year%*50)
+100,(population*750)+100
  140 NEXT
  150 REPEAT UNTIL
INKEY(0)=32
  160 END
```

Listing II

```
   10 REM LISTING II
   20 REM For Master and Arc
himedes
   30 MODE 0
   40 VDU28,0,0,79,0,24,0;0;
1200;900;
   50 MOVE 1100,100
   60 DRAW 1100,900
   70 INPUT "Reproduction ra
te : "R
   80 population=0.5
   90
  100 REPEAT
  110 MOVE 1100,(population*
800)+100
  120 population=(1-populati
on)*population*R
  130 DRAW 1200,(popula-
tion*800)+100
  140 VDU28,20,0,40,0:
PRINTA%
  150 PROCscroll
  160 UNTIL INKEY(0)=32
  170 END
  180
  190 DEF PROCscroll
  200 MOVE 0,0
  210 MOVE 1200,900
  220 PLOT189,-100,0
  230 ENDPROC
```

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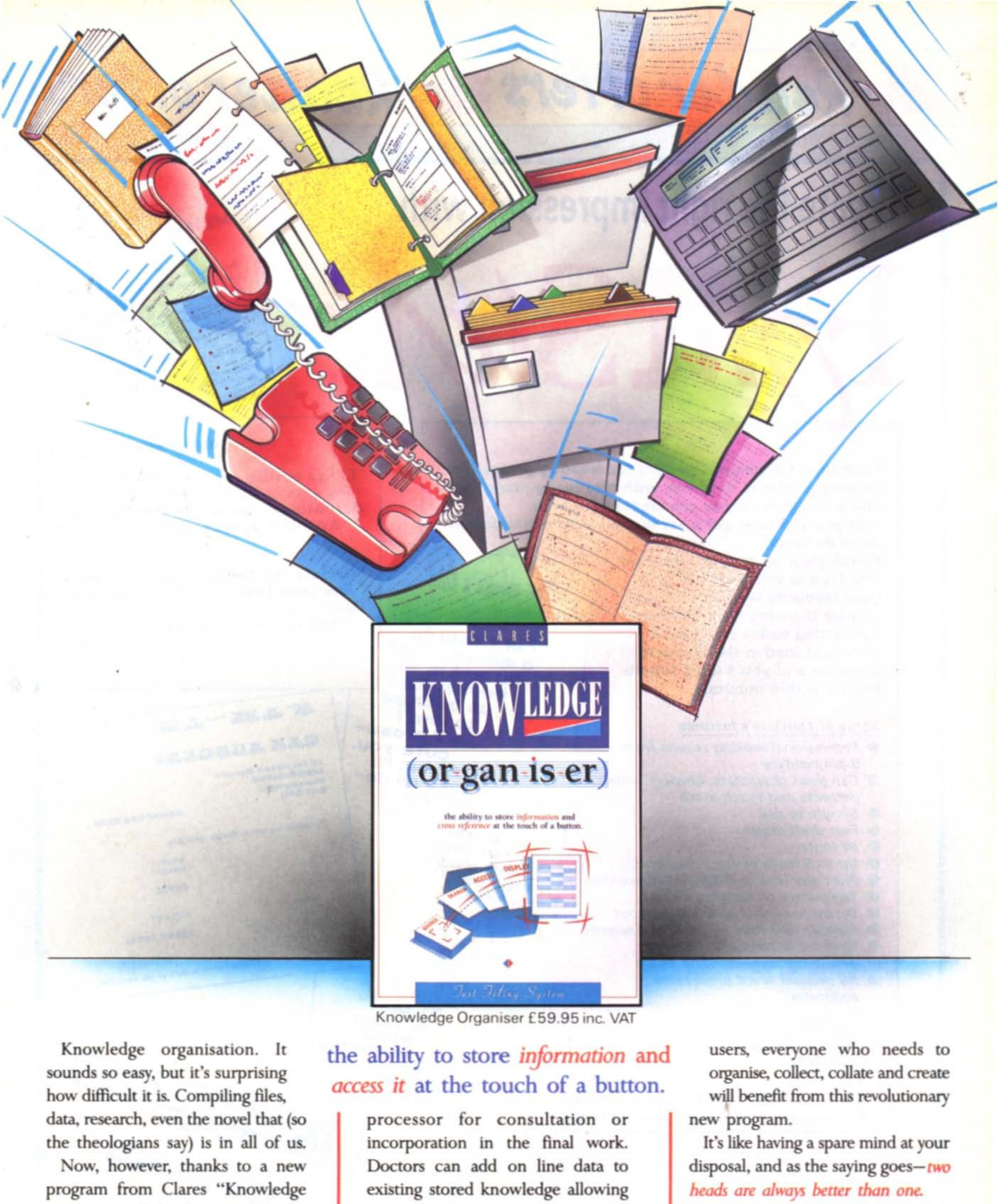
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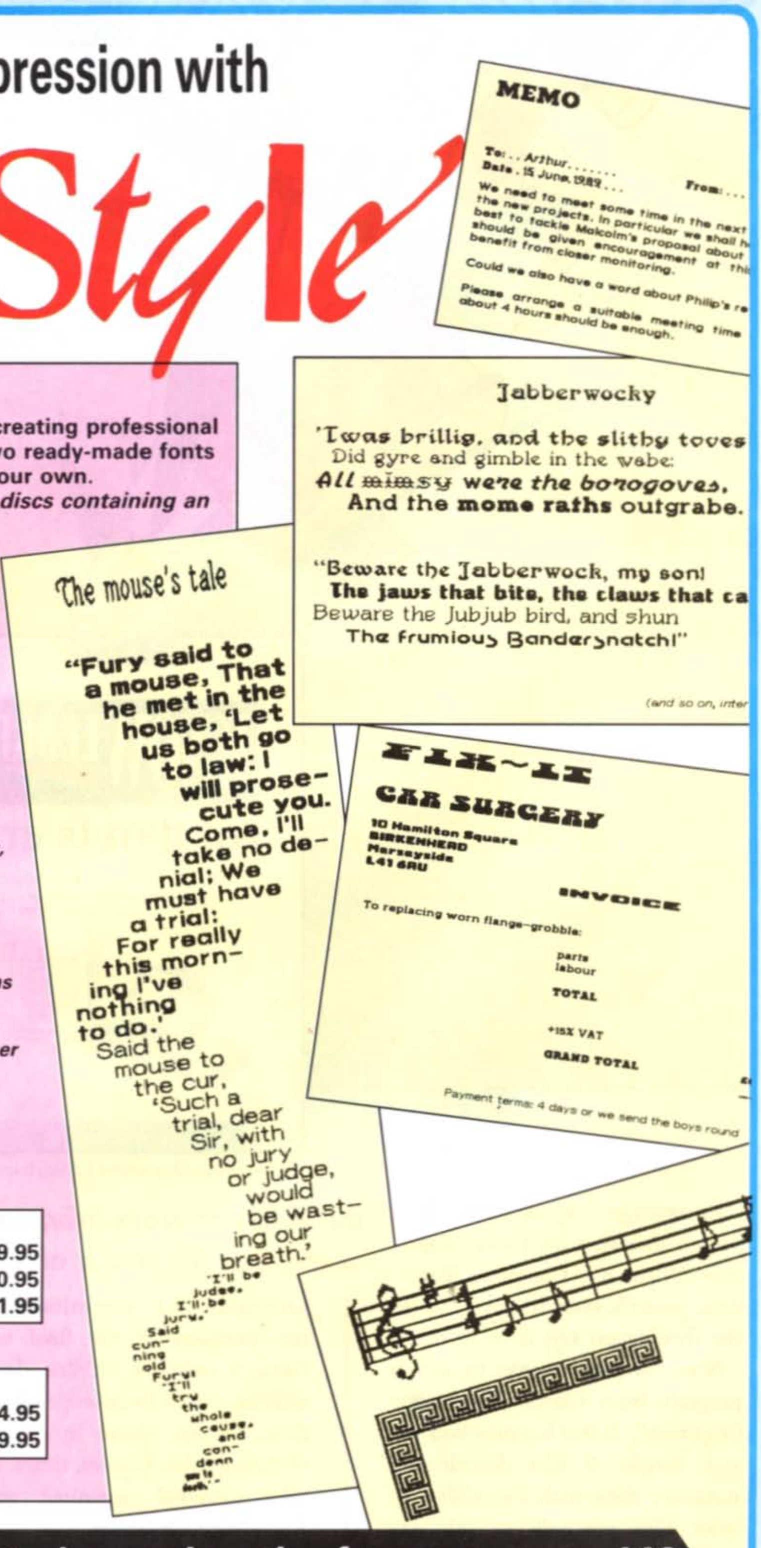

MEMO

To: .. Arthur.......
Date . 15 June, 1989 ...
From: ...

We need to meet some time in the next
the new projects. In particular we shall h
best to tackle Malcolm's proposal about
should be given encouragement at thi
benefit from closer monitoring.

Could we also have a word about Philip's re

Please arrange a suitable meeting time
about 4 hours should be enough.

Jabberwocky

'Twas brillig, and the slithy toves
Did gyre and gimble in the wabe:
All mimsy were the borogoves,
And the mome raths outgrabe.

"Beware the Jabberwock, my son!
The jaws that bite, the claws that ca
Beware the Jubjub bird, and shun
The frumious Bandersnatch!"

(and so on, inter

The mouse's tale

"Fury said to
a mouse, That
he met in the
house, 'Let
us both go
to law: I
will prose-
cute you.
Come, I'll
take no de-
nial; We
must have
a trial:
For really
this morn-
ing I've
nothing
to do.'
Said the
mouse to
the cur,
'Such a
trial, dear
Sir, with
no jury
or judge,
would
be wast-
ing our
breath.'
'I'll be
judge,
I'll be
jury,'
Said
cun-
ning
old
Fury!
'I'll
try
the
whole
cause,
and
con-
demn
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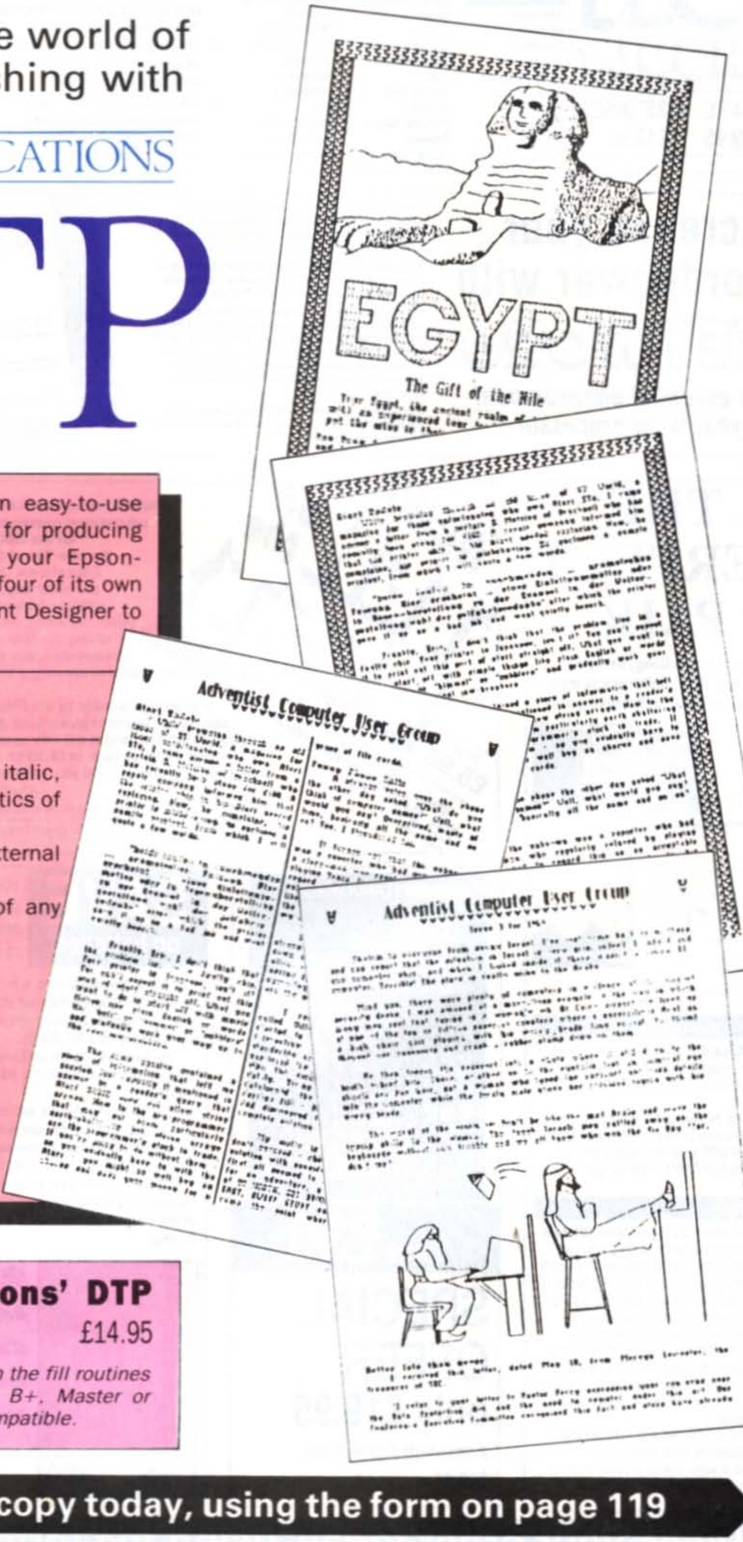

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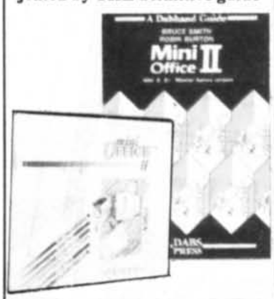

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(see page 116)

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(see page 78).

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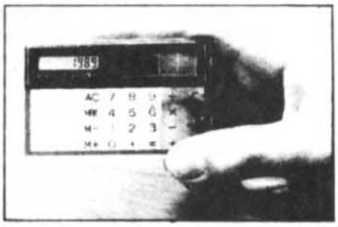

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MU3

It's all green to me

Continuing the light hearted saga of those two wacky micro buffs, Bob and Trev

Dear Trev

It's been a quiet month down at the Romchester Rogues. Doreen has got ecology (she caught it at her womens' studies course along with the shapeless clothes) and she's now sporting a "Rain Forests Don't Grow On Trees" badge. That's OK by me, what I don't like is the way that she stuck a "Small is Beautiful" badge on my trousers.

At one point she refused to use her BBC Micro until Clive assured her that it was ozone friendly. Since Clive thinks that ozone has something to do with the Colgate ring of confidence I don't reckon much to his opinion. Especially as he then went on to inform her that the Beeb was the most ecologically sound micro and that environmentally-minded owners of other makes of computer were green with envy. At one point things were so bad that she had me ring up the lads at The Micro User to see if it was printed on recycled paper.

"No, but it soon is," came the slightly puzzling reply. Doreen wasn't too happy about this until the editor convinced her that the sales figures showed he was saving more and more trees every month. She asked to speak to the managing editor but apparently he was away on his annual holiday studying lemmings.

I suppose I shouldn't complain about it, at least it got me the nearest thing to a compliment I'm ever likely to get from her: "One good thing about you, Bob, you're biodegradable." That was after I'd spent hours trying to convince her that the PCB in her micro was a printed circuit board and not something lethal (unless Clive was doing one of his Mike-Cook-eat-your-heart-out modifications).

I didn't mention the persistent rumours that there was still a ship full of Electrons sailing from port to port looking for somewhere to unload them with Herman Hauser playing the part of the Flying Dutchman.

The greening of Doreen wasn't the only excitement. Norman, a 50-year-old bachelor who'd be a misogynist except that he thinks that women aren't worth the trouble, finally finished his magnum opus: The BBC Micro Retarded Users Guide – a collection of hints, tips and folk wisdom gathered from the Romchester Rogues over a number of sessions. Since Norman doesn't know whether his user port was punched, reamed or bored and Clive says that he's a few bits short of the byte, I was looking forward to reading it.

I should point out that Norman is the star of one of the rogues' regular stories which began when someone told him that the Beeb was an 8 bit micro while the Barch was a 32. He promptly wrote to Mike Cook asking where he could get the other 24 bits for the upgrade (he'd started out with an Electron, so I suppose that's some excuse). Cookie must have been in a good mood because he wrote back saying that he'd figure out the answer and let him know in a bit.

Anyway, as I say, Norman had finished his masterpiece but, being Norman, he hadn't bothered to save it. He transferred it straight from his head into the micro's memory and switched off and lost it. That would have been bad enough, but he then wrote a nasty letter to the data protection agency saying they obviously weren't doing a good enough job as he'd lost all his and what were they going to do about it? In reply he got a letter which said that the authority had started a file on him and would he like to see the contents? Wisely he declined.

Meanwhile I've been working on a statistics program which attempts to map the number of occasions Doreen gets at me against the time of year. I've always suspected that she gets in more digs during the summer, but maybe it's just that the days are longer. They certainly seem it.

It was probably a bit ambitious – if you cast your mind back to our school days I was the one who thought that "thumb" came after "four". I was a sensitive lad and I still feel the pain when I remember how the other sixth formers laughed at me. I suppose I was a bit ambitious trying to do A level maths with my abilities. I'd really wanted to do French but Monsieur Lefrog had told me exactly what he'd do with his aunt's pen if he saw me in his class.

So my statistics program wasn't very good. Doreen said I needed a Poisson curve but it sounded a bit fishy to me. I asked Clive if he'd help.

He told me that my problem was that I'd used a chi squared distribution whereas he could get me a beta doubled one for a very good price.

It was all greek to me but the program's definitely improved. Instead of working two times out of three it now works four times out of thumb.

Cheers,

Bob.

PS: Clive claims to have produced a magnificent animation of an Archimedean Screw. D. won't let me watch it as it's graphic and might give me ideas.

➤ From Page 99

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3040 *!50!E0!F1!11"F1!31!07!10!89!CD"A9
3050 *!10!00"31!D1!3B!7F!77!F7!FF!B8"70
3060 *!50!02!50!70!24!F1!50!E0!71!19!71
3070 *!F1!31"34!14!89!8B!A8!B9!00#31!D3
3080 *!13!8B!B8!11!B8"70!60!01!60"34!F1
3090 *!50!E0!B1!15!B1!F1!31!24!60!A8!9E
3100 *!84!B3!66!00!31"13!43!B0!88!33!77
3110 *!F8!A0!70!A8!8D!A8!F8!D8!D1#E0!20
3120 *"E0!C2!58!78!B8"CE!8E!E0!CC!C1!E1
3130 *!C1!04!9D!1D!D1!00!F8!A0!70!D8!8A
3140 *!D8!F8!C8!D1"E0!60!08!61!E1!C3!D8
3150 *!F8!A8!CE!CD!FE!EE!FF!C0!2C!0C"3B
3160 *!91!51!00!F8!A0!70!E8!89!E8!F8!C8
3170 *!D1"E0!A0!04!A0!A4!86!C8!F8!A9!CF
3180 *!FC!CC!EE!FF!82!E0!0C!00!16!9A!00
3190 *!CC!F8!A0!70!F8!88"F8!C8!D1"E0!40
3200 *!0A!40!E0!C2"C8!B8!CD!EF!EE!FE!FF
```

➤

All program listings in this issue can be downloaded FREE on . . .
MicroLink

```
3210 *!0E!80!19!3B"59!80!00!F8!AD!70!E8
3220 *!89!E8!F8!C8!D1"E0!A0!04!AD!E0!42
3230 *#C8!BC!8C!1D!D1!88"C2!82!19!1D!51
3240 *!D9!00!F8!A0!70!D8!8A!D8!F8!C8!D1
3250 *"E0!60!08!60"C2!C8"8C!2C!D0!11!CC
3260 *!EE!42!60!51!97!12!DC!66!00!FC!D8
3270 *!F8!D8!8A!D8!F8!E8!F3!B1!F1!B1!15
3280 *!B1!F1!71!68!78!38!46!DF!8F!F8!88
3290 *!61!E1!C1!26!BF!1F!F1!11!FC!B8!F8
3300 *!B8!8C!B8!F8!E8!F3!71!F1!71!19!61
3310 *!E1!61!68!78!38!46!8F!F8!88!FF!60
3320 *!F1!D1!37!BF!1F!F1!11!FC!D8!F8!D8
3330 *!8A!D8!F8!E8!F3!B1!F1!B1!15!B1!F1
```

All program listings in this issue can be downloaded FREE on . . .

MicroLink

```
3340 *!71!68!78!38!46!DF!8F!F8!88!61!E1
3350 *!C1!26!BF!1F!F1!11!FC!E8!F8!E8!89
3360 *!68!78!68!F3!D1!F1!D1!13!D1!F1!71
3370 *!60!F8!B8!CE!DF!8F!F8!88!61!E1!C1
3380 *!26!1F!F1!11!FF!FC'F8!F3'F1"78!38
3390 *!46!DF!8F!F8!88"E1!C1!26!BF!1F!F1
3400 *!11!FC$F8#78!F3'F1!70!F8!B8!CE!DF
3410 *!8F!F8!88"E1!C1!26!1F!F1!11!FF!FC
3420 *'F8!F3'F1"78!38!46!DF!8F!F8!88"E1
3430 *!C1!26!BF!1F!F1!11!FC'F8!F3$F1#E1
3440 *"78!38!46!8F!F8!88!FF!E0!F1!D1!37
3450 *!BF!1F!F1!11!99!42!25!14!1C!3C!24
3460 *!16!99!24!4A!82!83!C3!42!86!01%8A
3470 *!CD!CC!08%15!3B!33#0F!F0#4B!F0#87
3480 *!F0#4B!F0#1E!F0#4B!F0#0F!F0#4B!F0
3490 *@FF!00!07!04%34!00!0F!00$F0!FE!00
3500 *!0F!00$F0!FE!00!0E!02%C2&34"35$F4
3510 *"F0!F3!F2#FA!FE"F0!FB!F1&C2!CA!C2
3520 *#35$34!07!F3!F2!FB$F0!0F!F9!F1!F9
3530 *$F0!0F'C2!0E!00$CF#8B!00$FF$00$FF
3540 *$00$3F#1DXXX
```

Get it right!

```
  10 =    0 0
  20 =    0 0
  30 =    0 0
  40 = 1C0B B
  50 = FE1C 5
  60 = 9D94 8
  70 = 7C21 3
  80 = 10F6 1
  90 = 304E 8
 100 = 35BE E
 110 = 78FA F
 120 = 9719 1
 130 = 81D1 9
 140 = 85CE 8
 150 = BBFF D
 160 = B92A 0
 170 = 9719 E
 180 = C076 A
 190 = 3D36 2
 200 = 76FD 9
 210 = 9719 1
 220 = 1C1B 7
 230 = 9036 D
 240 = B9AC E
 250 = E6CF D
 260 =  675 0
 270 = A8A3 8
 280 = 63F4 1
 290 = A9D2 0
 300 = 4C15 7
 310 = 7C1F 6
 320 = 2C67 1
 330 = 6596 9
 340 = 584B 2
 350 = 6FEC 7
 360 = 7B41 E
 370 = E827 4
 380 = 4092 0
 390 =  B88 6
 400 = 17BD 4
 410 = ACFF 1
 420 = 2D11 F
 430 = D47B 1
 440 = 11D6 B
 450 =  7E2 8
 460 = 623A 4
 470 = 1314 1
 480 = F846 A
 490 = 46C3 7
 500 = AF1F D
 510 = 8A78 B
 520 = 2DB5 C
 530 = F1F5 A
 540 =  B09 0
 550 = 2041 2
 560 = 4CCF 6
 570 = BECC D
 580 = AE0A 1
 590 = 7EBC C
 600 = 6D17 B
 610 = CAD5 3
 620 = D6F6 6
 630 = EC9D 4
 640 = 8F04 0
 650 = 6393 D
 660 = 4F8B 8
 670 = 33DE E
 680 = BA93 1
 690 = C94E 0
 700 =  686 1
 710 = A060 D
 720 = 67AF B
 730 = 8A22 3
 740 = 61BB 2
 750 = 8B4A 7
 760 = 7E0E D
 770 = 4A07 D
 780 = 73D6 C
 790 = D996 C
 800 = F864 B
 810 = D6E2 B
 820 = 1CD1 3
 830 = D746 9
 840 = E7B3 7
 850 = FB3B 2
 860 = 1880 2
 870 = 30F9 B
 880 = 805B 6
 890 = F783 E
 900 =  834 2
 910 = 3A1E 8
 920 = 4A8F F
 930 = 8BD1 2
 940 = 4655 F
 950 = F015 7
 960 =  9BE 9
 970 = 9793 8
 980 = 474B 1
 990 = FC70 D
1000 = 48F2 B
1010 = 8C9B 6
1020 = 9EEF F
1030 = 1095 E
1040 = 3D90 E
1050 = C798 0
1060 = D93C A
1070 = BF67 B
1080 = 7F88 3
1090 = 6502 9
1100 =  9EF D
1110 = BC6C A
1120 = B5FD B
1130 = 85B8 E
1140 = 9B56 4
1150 = E174 C
1160 = 8F81 6
1170 = 7882 A
1180 = 9F60 4
1190 = 1498 F
1200 = 8C55 2
1210 = FEF3 4
1220 = AD12 7
1230 = 9A1C F
1240 = EB34 C
1250 = 200F B
1260 = FD30 6
1270 = CD32 3
1280 = 1D03 1
1290 = CBB7 B
1300 = F6C9 4
1310 = 48C8 3
1320 = 534F F
1330 = 353F 0
1340 = 71C9 0
1350 = 96F0 9
1360 = 7098 6
1370 = F2F2 1
1380 = 3764 C
1390 = 762B 2
1400 =  20C B
1410 = 2F3F A
1420 = 70EA 9
1430 = 99CB F
1440 = E54B 7
1450 = 5532 7
1460 = CCF7 5
1470 = 51CA B
1480 = 1774 7
1490 = 8C64 2
1500 = 32EC 1
1510 = 21E5 C
1520 = 3AAB 5
1530 = 8975 9
1540 = 9164 5
1550 = 1B82 F
1560 = 266F D
1570 = 1BC6 4
1580 = 9775 5
1590 = D3E1 3
1600 = 79AF 0
1610 = AD07 0
1620 = 2A5C C
1630 =  3DF 4
1640 = 25DE 2
1650 = B107 5
1660 = DAC6 7
1670 = E928 8
1680 =  EE5 7
1690 = 53C0 A
1700 =  75D 7
1710 = 16C3 A
1720 =  715 6
1730 = D01F 8
1740 = 7B49 7
1750 = D0B0 7
1760 = E813 7
1770 = FDAC F
1780 = BD4D 0
1790 =  C10 3
1800 = 1C60 1
1810 = 5107 D
1820 = 2B7A 4
1830 = A027 F
1840 = D810 D
1850 = 8867 B
1860 = 4D80 1
1870 = 4A76 E
1880 = B81C 8
1890 = 4E21 F
1900 = D94B 4
1910 = 180D 3
1920 = 7CF5 8
1930 = 6059 A
1940 =  292 5
1950 = 998B 4
1960 = 47BD 0
1970 = 18ED 9
1980 = F71C 9
1990 = 9648 C
2000 = C8F5 C
2010 = FF30 F
2020 = E652 C
2030 = E50B A
2040 = ADE8 0
2050 = 137C 7
2060 = 613F 7
2070 = F549 F
2080 = D831 B
2090 = D299 9
2100 = 61F8 5
2110 = 5252 6
2120 = AA3B C
2130 = F401 D
2140 = 4C5F E
2150 = 5230 3
2160 = A437 2
2170 = 75D5 3
2180 = FC28 8
2190 =  2D4 0
2200 = D43C 6
2210 = B88A 8
2220 = 2A69 E
2230 = 56CA 4
2240 = AD4A 4
2250 = 967E 4
2260 = 7C42 4
2270 = 3EE6 9
2280 = D6D7 4
2290 = 7310 3
2300 = B07B C
2310 = 8E7E E
2320 = 2B9A 5
2330 = D776 D
2340 = 1DA8 0
2350 = DB6C 1
2360 = 8E1A 4
2370 = 6344 E
2380 = D352 4
2390 = 2708 5
2400 = FF8F 7
2410 = CFC2 B
2420 = E5EB 0
2430 = E295 3
2440 = BD51 7
2450 =  966 B
2460 = DDA4 B
2470 = 4EC3 9
2480 = 8070 A
2490 = 5030 F
2500 = 142B 2
2510 =  DAF 5
2520 = 63C7 7
2530 = 38DB 8
2540 = BD98 0
2550 = 41BB 5
2560 = DD3B 7
2570 = EF22 B
2580 = BDC4 6
2590 = 5E70 9
2600 = E517 E
2610 = DEF5 1
2620 = 4466 1
2630 =  98C 0
2640 = 59FF 4
2650 = 12D9 2
2660 = 487E D
2670 = B7D3 1
2680 = 2742 7
2690 = 4AFA 5
2700 =  4FE 0
2710 = 2AE4 C
2720 = 8FC5 F
2730 = 6357 4
2740 =  302 9
2750 = 9BE2 7
2760 = 9749 9
2770 = D18C D
2780 = 6DE3 A
2790 = 580B F
2800 = AC48 E
2810 = 6392 4
2820 = A98E 9
2830 = D88F 2
2840 = 3DD4 7
2850 = 19A8 5
2860 = 6E17 E
2870 = 8CE7 E
2880 = 4F87 7
2890 = AE73 F
2900 = 2529 8
2910 = 427B 0
2920 = F53B E
2930 = 618B 9
2940 = E0F2 4
2950 = 5DAD 7
2960 = B349 9
2970 = 8F69 4
2980 =  F5A 8
2990 = E9FE C
3000 = D8D8 7
3010 = 5B80 D
3020 =   62 D
3030 = E1BF 6
3040 = BF17 5
3050 = A7DA 4
3060 = 1EBA D
3070 = CCE8 1
3080 = F3AC C
3090 = 74AF 0
3100 = 6154 1
3110 = 87B8 0
3120 = 2D75 D
3130 = 7CA3 B
3140 = B58C F
3150 = 705F 7
3160 = 8152 A
3170 = 1F0E A
3180 =  DBC 5
3190 = 39E3 2
3200 = 24E9 A
3210 = AED0 6
3220 = 6B8A 1
3230 = 8E3F 1
3240 = 9BD9 9
3250 = AE9C D
3260 = DBF4 7
3270 = 1BE7 8
3280 = 353A F
3290 = 7BE9 8
3300 = 62FD C
3310 = 4483 F
3320 =  4BF 5
3330 = A974 6
3340 = BC8C F
3350 = 3BD5 F
3360 = 59E1 9
3370 = D520 B
3380 = 71DB 4
3390 = A1FA C
3400 = 53EE 4
3410 = E403 E
3420 = B1D3 5
3430 = CCF7 8
3440 = F08D 3
3450 = BF57 1
3460 =  B5F C
3470 = 8865 1
3480 = ACC5 3
3490 = 9C22 1
3500 = 3758 8
3510 = C7F0 8
3520 = 4086 5
3530 = B78B E
3540 =  691 2
```

Listing II

```
   0 REM Dickie Brickie part 1
   1 REM by Mike Goldberg
   2 REM (c) The Micro User
  10 MODE7
  20 PRINTTAB(7,1)CHR$141CHR$131"DICKIE
BRICKIE"
  30 PRINTTAB(7,2)CHR$141CHR$133"DICKIE
BRICKIE"
  40 A=9
  50 PRINT
  60 PRINTTAB(A)"Z = LEFT"
  70 PRINTTAB(A)"X = RIGHT"
  80 PRINTTAB(A)"* = UP"
  90 PRINTTAB(A)"? = DOWN"
 100 PRINT
 110 PRINTTAB(A)"D = DROP BRICKS"
 120 PRINTTAB(A-5)"RETURN = DRAW PATH"
 130 PRINTTAB(A-4)"SPACE = ERASE PATH"
 140 PRINTTAB(A-4)"SHIFT = MOVE ROBOT/E
RASE BRICKS"
 150 PRINT
 160 PRINTTAB(A)"H = HYPERSPACE!"
 170 PRINT
 180 PRINTTAB(A)"Q = QUIET"
 190 PRINTTAB(A)"S = SOUND ON"
 200 PRINTTAB(A-5)"DELETE = PAUSE GAME"
 210 PRINTTAB(A-3)"COPY = RESTART GAME"
 220 PRINT'
 230 PRINTSPC4"Press SPACE to load and
play...";
 240 ENVELOPE1,1,8,0,0,10,0,0,127,-1,-1
```

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```
,-3,126,100
  250 ENVELOPE2,1,4,-3,0,20,10,0,127,-1,
-1,-4,20,20
  260 ENVELOPE3,1,-12,40,2,10,13,14,127,
-1,-1,-3,120,120
  270 ENVELOPE4,1,-1,1,-2,5,5,5,127,-1,-
1,-1,126,100
  280 ENVELOPE5,1,50,50,30,30,30,30,127,
-1,-1,-1,126,100
  290 ENVELOPE6,1,4,-4,0,13,31,0,126,-1,
-1,-4,120,120
  300 ENVELOPE7,129,-4,-3,0,20,10,20,127
,-1,-1,-3,120,90
  310 ENVELOPE8,1,0,0,0,0,0,0,126,-1,-1,
-1,126,126
  320 ENVELOPE9,1,2,-1,15,3,3,2,10,-1,-1
,-1,126,126
  330 ENVELOPE10,1,1,-2,0,4,4,4,50,-1,-1
,-1,120,120
  340 ENVELOPE11,1,1,0,0,200,0,0,126,-1,
-1,-1,0,0
  350 ENVELOPE12,1,0,0,0,0,0,0,126,-1,-1
,-1,126,126
  360 ENVELOPE13,1,0,0,0,0,0,0,126,-1,-1
,-8,126,126
  370 ENVELOPE14,1,1,-1,0,1,1,0,126,-1,-
4,-8,126,0
  380 ENVELOPE15,1,0,0,0,0,0,0,126,-1,-1
,-1,120,120
  390 *FX20
  400 PROCvdu
  410 REPEATUNTILGET=32
  420 *LOAD DATA 6000
  430 CLS:PRINT''"Shifting memory...won'
t be a moment..."
  440 CHAIN"GAME2"
  450 END
  460 DEFPROCvdu
  470 FORI%=48TO57
  480 READA,B,C;D,E,F,G,H
  490 VDU23,I%,A,B,C,D,E,F,G,H
  500 NEXT
  510 ENDPROC
  520 DATA0,60,66,66,66,66,66,60,0,24,40
,8,8,8,8,62,0,60,66,2,12,48,64,126,0,60,
66,2,28,2,66,60,0,8,24,40,72,126,8,8,0,1
26,64,64,124,2,66,60,0,60,66,64,124,66,6
6,60,0,126,2,4,4,8,8,16,0,60,66,66,60,66
,66,60,0,60,66,66,62,2,66,60
>*:1.xs
```

Get it right!

```
  0 =    0 0 | 170 = FF3E 0 | 360 = 7E87 3
  1 =    0 0 | 180 = D46E B | 370 = 478A 3
  2 =    0 0 | 190 = 25E7 B | 380 = E69E F
 10 = 8AFC C | 200 = 7E3C F | 390 = A5D4 9
 20 = 1DA4 A | 210 = 38E8 4 | 400 = F151 A
 30 = D8E2 4 | 220 = 7475 7 | 410 = 5B81 E
 40 = FE2E F | 230 = 7C59 F | 420 = 20A2 8
 50 = FF3E C | 240 = 4DE3 9 | 430 = F79C B
 60 = BE3F D | 250 = FD8F 0 | 440 = 2010 9
 70 = 50FA 0 | 260 = 1696 5 | 450 = FD2E 0
 80 = 2789 A | 270 = 3295 8 | 460 = E7C9 4
 90 = C3BB 0 | 280 = 32DB 5 | 470 = 74DC 3
100 = FF3E 2 | 290 = 1837 0 | 480 = C9CA 8
110 = 3137 5 | 300 =  896 C | 490 = ABC2 8
120 = 926B 5 | 310 = 2054 1 | 500 = 2C83 A
130 = 79BF 1 | 320 = 4DC6 4 | 510 = EDOF 5
140 = E014 5 | 330 = 7FCF 2 | 520 = C9E8 1
150 = FF3E 1 | 340 = 6068 8 |
160 = C69A 9 | 350 = 951A 4 |
```

Listing III

```
    0 REM Dickie Brickie part 2
    1 REM by Mike Goldberg
    2 REM (c) The Micro User
   10 IFPAGE<>&E00GOTO3080
   20 CLEAR:?&E04=244
   30 REM
   40 REM
   50 REM
   60 FORI%=0TO&1960STEP4
   70 I%!&3E00=I%!&6000
   80 NEXT
   90 DIMM%(19),B%(3),b%(1),L%(3),d%(7),
bl%(3),ba%(3),c%(3),lk%(3),pos%(3),up%(3
),HS%(8),HS$(8)
  100 FORI%=0TO3
  110 READL%(I%),bl%(I%),ba%(I%),c%(I%),
lk%(I%)
  120 NEXT
  130 DATA-640,-15,-16,-640,0,16,25,16,1
6,8,640,-631,-640,640,320,-16,965,640,-1
6,328
  140 FORI%=0TO7:d%(I%)=1:HS%(I%)=125000
0-(I%*100000):READHS$(I%):NEXT
  150 DATABRIAN,BILL,GEORGE,KEVIN,STEVE,
SALLY,TREVOR,SHARON
  160 h%=-1:FORI%=&5400TO&5660STEP&20:h%
=h%+1:M%(h%)=I%:NEXT
  170 REPEAT
  180 MODE5
  190 VDU23;8202;0;0;0;
  200 PROCinit
  210 REPEAT
  220 COLOUR3:COLOUR128
  230 PROCscreen
  240 COLOUR3:COLOUR128
  250 PROCstart
  260 REPEAT
  270 IFRND(40)=2PROCpo
  280 IFys%=0PROCkeys
  290 IFys%=1ANDRND(40)=2ys%=0:SOUND1,4,
50,1:SOUND1,4,58,1
  300 IFstp%=0PROCBAD
  310 IFstp%=1AND TIME>500stp%=0
  320 IFgo%=1PROCbeast
  330 UNTILlv%=0ORn%=0
  340 *FX15
  350 IFn%=0PROCtune3
  360 IFn%=0SN%=SN%+1
  370 IFSN%=17SN%=1
  380 UNTILlv%=0
  390 *FX15
  400 PROCtune1
  410 REPEATUNTILGET=32
  420 MODE7:PROChst
  430 UNTIL0
  440 DEFPROCinit
  450 GCOL0,3
  460 FORI%=832TO1020STEP8
  470 PLOT77,640,I%
  480 NEXT
  490 GCOL0,0:MOVE384,848:PLOT1,0,128:PL
OT81,512,-128:PLOT81,0,128
  500 MOVE56,888:PLOT1,0,80:PLOT81,264,-
80:PLOT81,0,80
  510 GCOL0,1:MOVE376,848:PLOT1,0,128:PL
OT1,528,0:PLOT1,0,-128:PLOT1,-528,0
  520 MOVE48,880:PLOT1,0,96:PLOT1,280,0:
PLOT1,0,-96:PLOT1,-280,0
  530 GCOL0,0:MOVE1088,880:PLOT1,0,96:PL
OT81,128,-96:PLOT81,0,96
  540 GCOL0,1:MOVE1080,880:PLOT1,0,96:PL
OT1,136,0:PLOT1,0,-96:PLOT1,-136,0
  550 GCOL0,0:MOVE952,880:PLOT1,0,96:PLO
T81,72,-96:PLOT81,0,96
  560 GCOL0,1:MOVE952,880:PLOT1,0,96:PLO
T1,72,0:PLOT1,0,-96:PLOT1,-72,0
  570 O%=&FFFFFFFF
  580 O2%=&FFBDDBFF
  590 OB%=O%
  600 A%=&5680:B%=&56C0
  610 lv%=3
  620 SN%=1
  630 wf%=248
  640 COLOUR2:PRINTTAB(6,2)"00000000"
  650 S%=0
  660 noo%=8
  670 ENDPROC
  680 DEFPROCstart
  690 PROCtune2
  700 X%=&6210
  710 W%=0:w%=0
  720 E%=8:F%=320
  730 o%=0:f%=0:g%=0
  740 go%=0:dr%=0
  750 PROCyou(X%,M%(W%))
  760 COLOUR2:COLOUR128
  770 PROCdraw(&5A90,&5400)
  780 PRINTTAB(4,2)" "TAB(2,2)"=";lv%TAB
(17,2);SN%TAB(15,2)"1"TAB(15,3)"x"
  790 IFSN%<10PRINTTAB(18,2)" "
  800 n%=4
  810 O%=&FFFFFFFF
  820 G%=0
  830 P=0
  840 xl%=0
  850 ds%=1
  860 FORI%=0TO3:up%(I%)=0:NEXT
  870 a%=0
  880 COLOUR1:PRINTTAB(6,4)"0":IFHS%(0)>
=S%PRINTTAB(14-(LENSTR$(HS%(0))),4);HS%(
0) ELSEPRINTTAB(14-(LENSTR$(S%)),4);S%
  890 FORT=1TO2000:NEXT
  900 stp%=0:ys%=0
  910 ENDPROC
  920 DEFPROCscreen
  930 VDU28,0,31,19,6
  940 COLOUR131:CLS
  950 VDU26
  960 rest%=SN%*10+2320
  970 M%=&4FE0+(&20*SN%)
  980 RESTORErest%
  990 READc$:FORI%=0TO3:VDU19,I%,VAL(MID
$(c$,I%+1,1));0;:NEXT
 1000 X%=&5F80:READA$
 1010 FORK%=1TO78STEP6:FORJ%=0TO4STEP2:N
%=EVAL("&"+MID$(A$,K%+J%,2))
 1020 IFJ%=4Z%=16ELSEZ%=256
 1030 IFJ%=4R%=3ELSER%=7
 1040 FORV%=0TOR%:Z%=Z%DIV2:IF(Z%ANDN%)>
0PROCdraw(X%,M%)
 1050 X%=X%+16:NEXT:NEXT:X%=X%+320:NEXT
 1060 V%=&4780+(SN%*&80)
 1070 READB$
 1080 FORI%=1TO7STEP2
 1090 X%=ASCMID$(B$,I%,1)-64
 1100 Y%=ASCMID$(B$,I%+1,1)-64
 1110 Z%=&5800+((X%-1)*16+(Y%*2+4)*320)
 1120 pos%(I%DIV2)=Z%
 1130 PROCdraw2(Z%,&56E0)
 1140 NEXT
 1150 b%(0)=&3DC0+(SN%*&40):b%(1)=b%(0)+
&20
 1160 PROCdraw(&7B10,&5680):BX%=&7B10
 1170 ?&6210=0
 1180 READnob%
 1190 FORJ%=0TO(nob%-1)
 1200 GOSUB2490:B%(J%)=P%
 1210 PROCdraw(B%(J%),b%(0))
 1220 NEXT
 1230 ENDPROC
 1240 DEFPROCkeys
 1250 IFgo%=1ENDPROC
 1260 IFINKEY-67o%=0:y%=1:PROCM(E%,X%,X%
+16,X%+336)
 1270 IFINKEY-98o%=6:y%=3:PROCM(-E%,X%+8
,X%-8,X%+312)
 1280 IFINKEY-73o%=16:y%=0:PROCM2(-F%,X%
+320,X%-320,X%-312)
 1290 IFINKEY-105o%=12:y%=2:PROCM2(F%,X%
,X%+640,X%+648)
 1300 IFINKEY-740%=02%
 1310 IFINKEY-990%=&FFFFFFFF
 1320 IFINKEY-1PROCok
 1330 IFINKEY-51ANDdr%=0ANDX%MOD16=0AND(
X%-&5800)DIV320MOD2=0ANDX%?16=255ANDX%?3
36=255ANDX%?24=255ANDX%?344=255SOUND3,7,
170,1:PROCdraw(X%+16,&56A0):dr%=1:db%=X%
+16
 1340 IFINKEY-85S%=0:GOSUB2650:COLOUR2:C
OLOUR128:PRINTTAB(6,2)"00000000"
 1350 IFINKEY-90REPEATUNTILINKEY-106
 1360 IFINKEY-17 THEN *FX210,1
 1370 IFINKEY-82 THEN *FX210,0
 1380 ENDPROC
 1390 DEFPROCok
 1400 PROCbeast:IFgo%=1FORI%=0TO12STEP4:
I%!X%=0%:I%!(X%+320)=0%:NEXT:X%=ob%:PROC
draw(X%,M%(W%)):PROCdraw(BX%,A%):ENDPROC
 1410 IFgo%=0ANDdr%=1PROCexp(db%):dr%=0
 1420 ENDPROC
 1430 DEFPROCyou(x%,m%):FORI%=0TO12STEP4
:I%!x%=I%!m%:I%!(x%+320)=I%!(m%+&10):NEX
T:ENDPROC
 1440 DEFPROCM(a%,b%,c%,d%)
 1450 IF?c%<>255OR?d%<>255PROChb:IFG%<>w
f%ENDPROC
 1460 W%=(W%+1)MOD6+o%
 1470 FORI%=0TO4STEP4:I%!b%=0%:I%!(b%+32
0)=0%:NEXT:X%=X%+a%:PROCyou(X%,M%(W%))
 1480 ENDPROC
 1490 DEFPROCM2(a%,b%,c%,d%)
 1500 IF?c%<>255OR?d%<>255PROChb:IFG%<>w
f%ENDPROC
 1510 w%=(w%+1)MOD4:W%=w%+o%
 1520 FORI%=0TO12STEP4:I%!b%=0%:NEXT:X%=
X%+a%:PROCyou(X%,M%(W%))
 1530 ENDPROC
 1540 DEFPROCdraw(x%,m%):FORT%=0TO12STEP
4:T%!x%=T%!m%:T%!(x%+320)=T%!(m%+&10):NE
XT:ENDPROC
 1550 DEFPROCdraw2(z%,v%)
 1560 FORT%=0TO28STEP4:T%!z%=T%!v%:T%!(z
%+320)=T%!(v%+&20):T%!(z%+640)=T%!(v%+&4
0):T%!(z%+960)=T%!(v%+&60):NEXT:ENDPROC
 1570 DEFPROCBAD
 1580 f%=(f%+1)MODnob%
 1590 IFRND(4)=1PROCc2
 1600 bp%=(B%(f%)+L%(d%(f%)))
 1610 IFbp%=X%PROCy:PROCdie:ENDPROC
 1620 IF?bp%=248ANDbp%<>X%PROCy:ENDPROC
 1630 yes%=0
 1640 FORi%=0TO3
 1650 IF?(bp%+lk%(i%))=255yes%=yes%+1
 1660 NEXT
 1670 IFyes%=1PROCc2
 1680 IFyes%=4PROCy:ENDPROC
 1690 IFyes%=0ANDbp%<>X%PROCc:ENDPROC
 1700 IFyes%=3ORyes%=2PROCy:PROCdie:ENDP
ROC
 1710 PROCy
 1720 ENDPROC
 1730 DEFPROCy
 1740 SOUND2,2,140,1
 1750 IFf%=0g%=(g%+1)MOD2
 1760 PROCerase(B%(f%)):B%(f%)=bp%:PROCd
raw(B%(f%),b%(g%))
 1770 ENDPROC
 1780 DEFPROCc
 1790 p%=RND(4)-1
 1800 t%=?(B%(f%)+L%(p%)):IFt%=255ORt%=2
48d%(f%)=p%
 1810 ENDPROC
 1820 DEFPROCc2
 1830 IFd%(f%)MOD2=0p%=RND(2)*2-1
 1840 IFd%(f%)MOD2=1p%=RND(2)*2-2
 1850 t%=?(B%(f%)+L%(p%)):IFt%=255ORt%=2
48d%(f%)=p%
 1860 ENDPROC
 1870 DEFPROCerase(q%)
 1880 FORI%=0TO12STEP4:I%!q%=0B%:I%!(q%+
320)=0B%:NEXT
 1890 ENDPROC
 1900 DEFPROCbeast
 1910 ob%=BX%
 1920 go%=0:FORe%=0TO3
 1930 IF?(BX%+bl%(e%))=219SOUND0,8,3,1:S
OUND1,0,100+P,1:PROCdraw(BX%,B%):BX%=BX%
+ba%(e%):PROCdraw(BX%,A%):go%=1:P=P+1
 1940 IF?(BX%+ba%(e%))=15PROCdraw(BX%,B%
):BX%=BX%+ba%(e%):PROCdraw(BX%,A%):go%=1
:dr%=0:PROCbang
 1950 NEXT
 1960 IFgo%=0P=0
 1970 ENDPROC
 1980 DEFPROCbang
 1990 FORQ%=0TO3
 2000 IFup%(Q%)=0:IFpos%(Q%)+1280=db%ORp
os%(Q%)+1296=db%ef%=pos%(Q%):PROCscroll:
up%(Q%)=1
 2010 NEXT
 2020 ENDPROC
 2030 DEFPROCscroll
```

All program listings in this issue can be downloaded FREE on . . .

MicroLink

```
 2040 SOUND1,9,1,5
 2050 FORT=0TO&40STEP8
 2060 PROCdraw2(ef%,V%+&40-T)
 2070 NEXT
 2080 PROCdraw2(ef%,V%)
 2090 n%=n%-1
 2100 PROCsc(1000*SN%)
 2110 ENDPROC
 2120 DEFPROChb
 2130 hit%=0
 2140 FORht%=0TO(nob%-1):IFX%-B%(ht%)=-c
%(y%)hit%=1
 2150 NEXT
 2160 IFhit%=1PROCdraw(X%,B%):X%=X%+a%:P
ROCdraw(X%,M%(W%)):PROCdie:ENDPROC
 2170 hs%=X%+c%(y%):G%=?hs%:H%=hs%?1:IFG
%=wf%PROCwot
 2180 ENDPROC
 2190 DEFPROCwot
 2200 PROCdraw(hs%,B%)
 2210 k%=0:RESTORE2230:REPEATk%=k%+1:REA
Dgv%:UNTILgv%=H%:GOSUB(2630+(k%*10)):H%=
0
 2220 ENDPROC
 2230 DATA240,224,128,135,129,145,131,21
3
 2240 DEFPROCdie
 2250 ys%=0
 2260 SOUND1,5,90,1:lv%=lv%-1:COLOUR2:CO
LOUR128:PRINTTAB(4,2)" "TAB(3,2);lv%
 2270 FORs=&4700TO&47E0STEP&20:PROCdraw(
X%,s):FORt=1TO100:NEXT:NEXT
 2280 FORs=&47E0TO&47A0STEP-&20:PROCdraw
(X%,s):FORt=1TO100:NEXT:NEXT
 2290 PROCdraw(X%,B%):IFlv%=0ENDPROC
 2300 FORe=1TO8:g%=(g%+1)MOD2:FORd=0TOno
b%-1:PROCdraw(B%(d),b%(g%)):NEXT:FORf=1T
080:NEXT:NEXT
 2310 GOSUB2490:X%=P%:G%=0:SOUND0,-15,7,
15:SOUND1,11,150,15:FORs=&47E0TO&4700STE
P-&20:PROCdraw(X%,s):FORt=1TO100:NEXT:NE
XT:PROCdraw(X%,M%(0)):W%=0
 2320 ENDPROC
 2330 DATA0134,FFFF0F810001A5450D804101B
60301B47905840001A03805A5A00185A80580280
1810001FFFF0F,KCGFDIOI,4
 2340 DATA0421,FFFF0F810001AD7805A51805B
51001A1030DBC780189C0098B1801805805BDD30
D800001FFFF0F,OCJDCHOH,4
 2350 DATA0435,FFFF0F800001A0F309A08005A
08405A08405A0F70DA08405A08405A08405BEF40
5800001FFFF0F,ECPDFGKH,3
 2360 DATA0124,FFFF0F804001804C01D41203C
06103D008038B8001800001 8A0001919F0D81910
18C0405FFFF0F,HBRBNGJJ,3
 2370 DATA0153,FFFF0F888005808801880805F
AFF0580840184050D858405BD840581DC05BC010
D80FC01FFFF0F,GBOBCFKG,4
 2380 DATA0134,FFFF0F9FFF09800001DC440BD
0440BD0440BDC4303C4440BC4440BDC440B80000
19FFF09FFFF0F,LDHEKHGI,4
 2390 DATA0124,FFFF0F83FE01B80003BBF603B
A1601BA160D800001DE9F05DE9F058E1F05AEDF0
580C001FFFF0F,QCHEJEJH,4
 2400 DATA0745,FFFF0F804005BF5E01A51305A
46201B42207A02E01A1E80DA00801A1E80BBFA30
9800001FFFF0F,MDHEEHOH,4
 2410 DATA0134,FFFF0F820001BAFE0982030BD
2C309964101847D05A44405AC4405AFC409A0010
38A9C07FFFF0F,LDGGPHLI,4
 2420 DATA0521,FFFF0F807803A400038FFE038
8410588510188510BEDDF01880105BFBC0580300
182070DFFFF0F,QBCEHENE,4
 2430 DATA0564,FFFF0F800001BFDE0D887309E
8520D880005B83F058B3D05E224058EA505BE850
180FC01FFFF0F,MDGEIGLI,4
 2440 DATA0435,FFFF0F800001AAAA0FAAAA0F8
AAA0F88A80F88A80FA8A00FAAAA0FAAAA09AAAA0
9800001FFFF0F,CEGFNFRJ,4
 2450 DATA0214,FFFF0F800001A88F05823005E
C88058C30058C9F0D88230DBAE20180E20DAEC20
D806001FFFF0F,ODCFGFLI,4
 2460 DATA0631,FFFF0F830001A178059160018
06E0F810801DFDA01840801AD2C01852A01A0210
3878801FFFF0F,OBEDQHII,4
 2470 DATA0135,FFFF0F814201BC420DA5E205A
4230DA4AE05B1A00DB8AE05828E05BE8E05BC8E0
5808001FFFF0F,LCDDPIJJ,4
 2480 DATA0431,FFFF0F812101A4000190E7018
E60058428018060018480098 0E005A2F80988010
1813003FFFF0F,OEBFGGNI,4
 2490 P%=(RND(18)*16)+(RND(11)*640)+&5F8
0
 2500 IF?P%<>255ORP%?8<>255ORP%?320<>255
ORP%?328<>255GOTO2490
 2510 RETURN
 2520 DEFPROCpo
 2530 U%=&45E0+(RND(noo%)*&20)
 2540 IFU%=&4660 ANDxl%=1ENDPROC
 2550 IFU%=&4660 xl%=1
 2560 GOSUB2490
 2570 PROCdraw(P%,U%)
 2580 ENDPROC
 2590 DEFPROCsc(s%)
 2600 S%=S%+(s%*ds%):l%=LENSTR$(S%)
 2610 COLOUR2:COLOUR128:PRINTTAB(14-l%,2
);S%
 2620 IFS%>HS%(0)COLOUR1:PRINTTAB(14-l%,
4);S%
 2630 ENDPROC
 2640 SOUND3,3,100,1:PROCsc(500):RETURN
 2650 SOUND3,1,90,1:GOSUB2490:PROCyou(X%
,B%):X%=P%:G%=0:PROCyou(X%,M%(W%)):RETUR
```

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```
➤
N
 2660 SOUND3,6,110,1:IFds%=9RETURN ELSEd
s%=ds%+1:COLOUR128:COLOUR2:PRINTTAB(15,2
);ds%:RETURN
 2670 SOUND3,4,182,1:lv%=lv%+1:COLOUR2:C
OLOUR128:PRINTTAB(4,2)" "TAB(2,2)"=";lv%
:RETURN
 2680 stp%=1:SOUND0,4,0,2:TIME=0:RETURN
 2690 SOUND3,3,150,1:PROCsc(RND(10)*1000
):RETURN
 2700 PROCdraw(X%,B%):X%=X%+a%:PROCdraw(
X%,M%(W%)):PROCdie:RETURN
 2710 SOUND1,9,170,3:ys%=1:RETURN
 2720 DEFPROCexp(db%):SOUND1,10,30,1:FOR
T=1TO20:PROCdraw(db%,&56A0+(T)):NEXT
 2730 PROCdraw(db%,B%)
 2740 ENDPROC
 2750 DEFPROCtune1
 2760 COLOUR2:PRINTTAB(6,4)"GameOver"
 2770 RESTORE2820:*FX201,1
 2780 FORU=1TO3:READJ:FORI=1TOJ:READP,D:
SOUND0,8,3,D:SOUND1,0,100+P,D:SOUND2,14,
8+P,D:FORT=1TO90:NEXT:SOUND3,14,8+P,D:NE
XT:SOUND0,13,7,1:SOUND1,0,220,1:A=INKEY1
10:SOUND0,13,7,1:SOUND1,0,220,1:A=INKEY5
0:NEXT:A=INKEY20
 2790 SOUND0,13,7,1:SOUND1,0,220,1:*FX20
1,0
 2800 PRINTTAB(6,4)"HitSPACE"
 2810 ENDPROC
 2820 DATA4,21,3,29,3,37,3,41,9,4,29,3,3
7,3,45,3,49,9,12,29,3,37,3,45,3,49,9,29,
3,37,3,45,3,49,9,21,3,29,3,37,3,41,9
 2830 DEFPROCtune2:RESTORE2860:*FX201,1
 2840 FORI=1TO8:READA,B,C,D:A=A-18:C=C-1
8:SOUND1,15,A,B:SOUND2,15,C,D:SOUND3,15,
A,B:NEXT:*FX201,0
 2850 ENDPROC
 2860 DATA109,1,109,1,117,6,117,6,109,6,
117,6,109,2,97,2,109,2,89,2,109,2,81,2,6
9,7,69,7,21,8,21,8
 2870 DEFPROCtune3:RESTORE2940
 2880 COLOUR2:PRINTTAB(6,4)"WellDone"
 2890 FORI=0TO3:SOUND1,10,90+(I*12),1:PR
OCdraw2(pos%(I),&5200):PROCdraw(pos%(I)+
328,&5680):NEXT
 2900 FORT=1TO1500:NEXT
 2910 FORI=1TO13:READA,B,C,D:A=A-48:C=C-
48:B=B-1:D=B:SOUND1,15,A,B:SOUND2,15,C,D
:NEXT
 2920 PRINTTAB(6,4)SPC8
 2930 ENDPROC
 2940 DATA117,3,117,3,137,4,137,4,117,4,
117,4,113,4,117,4,137,4,117,4,113,4,117,
4,109,4,109,4,137,4,117,4,109,4,109,4,10
5,8,137,8,61,4,61,4,65,7,85,7,69,4,85,4
 2950 DEFPROChst
 2960 GOSUB3060
 2970 PRINT'SPC8"Your score was ";S%
 2980 I%=-1:REPEAT:I%=I%+1:UNTILS%>HS%(I
%)ORI%=8:IFI%=8GOTO3030
 2990 FORJ%=7TOI%+1STEP-1:HS%(J%)=HS%(J%
-1):HS$(J%)=HS$(J%-1):NEXT:HS%(I%)=S%
 3000 INPUT'"Enter name "N$
 3010 HS$(I%)=LEFT$(N$,8)
 3020 GOSUB3060
 3030 *FX15
 3040 PRINT'"  Press SPACE to play again
...";:REPEATUNTILGET=32
 3050 ENDPROC
 3060 CLS:FORI=1TO2:PRINTTAB(11,I)CHR$14
1CHR$130"HI-SCORES":NEXT:FORI%=0TO7:PRIN
TTAB(6,I%*2+4)CHR$141CHR$131;HS$(I%)TAB(
28-(LENSTR$(HS%(I%))),I%*2+4);HS%(I%):PR
INTTAB(6,I%*2+5)CHR$141CHR$133HS$(I%)TAB
(28-(LENSTR$(HS%(I%))),I%*2+5);HS%(I%)
 3070 NEXT:RETURN
 3080 *TAPE
 3090 FORI%=0TO TOP-PAGE STEP4
 3100 I%!&E00=I%!PAGE:NEXT
 3110 ?&13=?&13-(PAGE-&E00)DIV256
 3120 PAGE=&E00:RUN
```

Get it right!

```
   0 =    0 0
   1 =    0 0
   2 =    0 0
  10 = 4BDD D
  20 = 9B60 2
  30 =    0 2
  40 =    0 2
  50 =    0 2
  60 = B42F 7
  70 =  B23 D
  80 = 2C83 3
  90 = 822C B
 100 = 882E 3
 110 = 9221 D
 120 = 2C83 7
 130 = 7D04 9
 140 =  C83 E
 150 = BDFB 1
 160 = 3A55 1
 170 = BFBA 5
 180 = AABE 3
 190 = F716 C
 200 = DEBB 3
 210 = BFBA 8
 220 = 68F0 E
 230 = 9538 2
 240 = 68F0 8
 250 = 9D5F 8
 260 = BFBA 1
 270 = A13A C
 280 = 2DC3 8
 290 = 3059 5
 300 = EAEB 5
 310 = 1180 9
 320 = 87AC F
 330 = 93AD 9
 340 = A022 1
 350 = A797 3
 360 = E29E 5
 370 = FAF4 2
 380 =   48 4
 390 = A022 F
 400 = 228B B
 410 = 5B81 0
 420 = DDB7 5
 430 = 53CE 8
 440 = 344C 3
 450 = 236D 4
 460 = 1D3B 2
 470 = F81D 9
 480 = 2C83 0
 490 = 5869 5
 500 = 67B7 A
 510 = 9B59 1
 520 = 32AD E
 530 = 7E6E 1
 540 = 3B53 6
 550 =  555 7
 560 = FA41 F
 570 = 6DAD 5
 580 = 141C 2
 590 = 9F32 9
 600 = D091 E
 610 = EFD4 1
 620 =  FAB B
 630 = A49F 2
 640 = DE15 7
 650 = C64B 2
 660 = 8706 6
 670 = ED0F 6
 680 = 363B A
 690 = 12E8 E
 700 = C653 F
 710 = 63E5 5
 720 = 7E7E 1
 730 = AD3C 4
 740 = FD54 F
 750 = 2995 6
 760 = 2D50 2
 770 = 3C44 5
 780 = 587C 7
 790 = 4620 2
 800 = 93A0 0
 810 = 6DAD 1
 820 = 171D E
 830 = 1B54 2
 840 = 21E7 2
 850 = 71FE A
 860 = 62D2 D
 870 =  7CA D
 880 = DE40 A
 890 = 1912 8
 900 = C00F 2
 910 = ED0F 6
 920 = F5B9 0
 930 = 3DFC B
 940 = 2149 D
 950 = B962 2
 960 = 15E5 B
 970 = 665E B
 980 = D46D 6
 990 = DCD2 5
1000 = F2C8 E
1010 = 7D0A B
1020 = BC94 3
1030 = 5B66 A
1040 = 37B6 7
1050 = D901 B
1060 = CF49 2
1070 = B54A D
1080 = A52C 7
1090 = A6C6 2
1100 = 3E54 A
1110 = E20F C
1120 = C002 E
1130 = AF01 B
1140 = 2C83 3
1150 = 4C1B 4
1160 = C966 E
1170 = 60AF 2
1180 = 84D9 C
1190 = 23E4 9
1200 = 1100 5
1210 = AE8F 6
1220 = 2C83 C
1230 = ED0F 1
1240 = 5A41 2
1250 = 3D8F 4
1260 = ECBE 0
1270 = 5E1D F
1280 = 484C 5
1290 = 8070 8
1300 = B74D C
1310 = 141B 3
1320 = 5516 F
1330 = ACDF 1
1340 =  1A6 2
1350 = C366 F
1360 = 3D70 F
1370 = 6DC9 9
1380 = ED0F F
1390 = DA6E 1
1400 = 7996 C
1410 = 1D2A 3
1420 = ED0F C
1430 = 44D2 1
1440 = AB51 A
1450 = 607C C
1460 = 71F4 9
1470 = 1FF8 D
1480 = ED0F C
1490 = E59C D
1500 = 607C 7
1510 = 91FD E
1520 = 7C62 D
1530 = ED0F 9
1540 = 66BD 2
1550 = 9014 8
1560 = F16D B
1570 = 21CD 1
1580 = D4BA A
1590 = E7AD D
1600 = BED0 E
1610 = 8F54 C
1620 = D979 E
1630 = C6F0 F
1640 = BD26 0
1650 = 5873 E
1660 = 2C83 3
1670 = 87A1 B
1680 = 833C B
1690 = 71E7 2
1700 = A632 8
1710 = 9A1D C
1720 = ED0F 0
1730 = BDD8 C
1740 = 1049 4
1750 = 2837 C
1760 = 6C70 A
1770 = ED0F A
1780 =  EA3 A
1790 = BCD8 D
1800 = F7CB 3
1810 = ED0F 8
1820 = 54DF 0
1830 = CF2D E
1840 = FC3B C
1850 = F7CB C
1860 = ED0F 4
1870 = 4DDF 6
1880 = E134 A
1890 = ED0F 6
1900 = C612 5
1910 = 533B 7
1920 = 8E00 D
1930 = EEE6 C
1940 = F60F 1
1950 = 2C83 2
1960 = E94F 2
1970 = ED0F 2
1980 = BDA7 C
1990 = 9FE8 3
2000 = 4D35 6
2010 = 2C83 0
2020 = ED0F 5
2030 = A8A2 8
2040 = ED89 A
2050 = F219 D
2060 = 49C6 5
2070 = 2C83 8
2080 = 68D3 3
2090 = 1A79 9
2100 = FFA3 B
2110 = ED0F 7
2120 = D2D0 4
2130 = 43D2 8
2140 = 55D4 3
2150 = 2C83 D
2160 = 942A C
2170 = D413 8
2180 = ED0F 6
2190 = 1C22 A
2200 = 672E 7
2210 = D62E B
2220 = ED0F A
2230 = 1A53 0
2240 = AEA7 F
2250 = 44FF 6
2260 = A343 3
2270 = 6480 D
2280 = FFE2 1
2290 = 54CC 6
2300 = 1154 1
2310 = 4FEF 3
2320 = ED0F 4
2330 = F69B C
2340 = 7A6F E
2350 =  227 9
2360 =  EB2 0
2370 = DCBF 3
2380 = 84C0 3
2390 = 69DE E
2400 = 4CCC 4
2410 = 37D5 2
2420 = B5AD 7
2430 = 3F30 9
2440 = B0E8 3
2450 = 191F 7
2460 = DAEF 0
2470 = 9D33 0
2480 = E9DC D
2490 = 73A9 8
2500 = 6ECF 1
2510 = 6E17 9
2520 = 89A7 C
2530 = C1DE D
2540 = D0E7 0
2550 = BFB5 1
2560 = 6C03 5
2570 = D53C 4
2580 = ED0F 6
2590 = 2C05 2
2600 = 5C33 E
2610 = 2148 9
2620 = C7C1 9
2630 = ED0F B
2640 = AAC1 B
2650 = C33E E
2660 = F2BD 1
2670 = 69C4 3
2680 = 7519 8
2690 = CD2A E
2700 = 9A3B 5
2710 = 460B F
2720 = 898C E
2730 = 6A61 C
2740 = ED0F B
2750 = 89EF 3
2760 = 9F0E 8
2770 = D17A F
2780 = 634E 0
2790 = ECD7 7
2800 = 8189 0
2810 = ED0F A
2820 = DBEF A
2830 = 2F09 C
2840 =  9ED F
2850 = ED0F 3
2860 = 7E32 D
2870 = C290 F
2880 = 5D24 1
2890 = 5AAB 2
2900 = F4A5 C
2910 = E1C8 7
2920 = 9B0F 3
2930 = ED0F 9
2940 = CD4D 4
2950 = 356E C
2960 = 2C2D 5
2970 = 9539 B
2980 = 7C06 8
2990 = 3299 C
3000 = 7D57 A
3010 = 69C8 3
3020 = 2C2D 0
3030 = A022 9
3040 = C219 4
3050 = ED0F E
3060 = E4A9 4
3070 = 6629 2
3080 = CD93 F
3090 = E402 6
3100 = A774 3
3110 = A805 2
3120 = 7290 F
```

This is a long listing, but well worth the effort of keying it in. However, if you prefer to save the wear and tear on your fingers, you will find the full program on this month's disc or tape – plus all the other listings from this issue. To find out how to obtain it turn to page 5

520ST-FM SUPER PACK

ATARI
520ST
ATARI 520 STFM WITH OVER £450 WORTH OF SOFTWARE
SUPER PACK

The Atari Super Pack is ideal for you if you want to get off to a flying start with the best in entertainment software. The Pack includes a 520ST-FM with ½Mb RAM, a built-in 1Mb disk drive, over £450 of top games and a joystick. If you buy the Super Pack at Silica Shop, we will add our own ST Starter Kit (worth over £200), Free Of Charge. Return the coupon for details.

£399
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Summer Olympiad '88	Tynesoft	**£19.95**

PRODUCTIVITY SOFTWARE

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JOYSTICK

Atari CX40 Joystick	Atari Corp	**£4.99**

FREE ATARI BUNDLE VALUE: £458.97

With SM124 mono monitor: £498 INC VAT With SC1224 colour monitor: £698 INC VAT

1040ST-FM PROFESSIONAL PACK

NOW WITH TV MODULATOR

For the serious home user and the small business, we are pleased to announce a new package based around the 1040ST-FM. The 1040ST-FM has 1Mbyte RAM and a 1Mbyte built-in disk drive. In addition, the 1040ST-FM now comes with a TV modulator built-in. (The previously available 1040ST-F was designed for use with a monitor only and did not come with a modulator.) This modulator allows the 1040ST-F to be plugged directly into any domestic TV set, and comes complete with a lead to allow you to do so. The new 'Professional Pack' from Silica includes the new 1040ST-FM with modulator plus four high quality software packages including a spreadsheet, database, word processor and programming language. This 'Professional Pack' software will enable you to get straight down to business with your new computer. In addition to this software (worth £384.84), if you buy the Professional Pack from Silica Shop, you will also receive the Silica ST Starter Kit (worth over £200), Free Of Charge. Return the coupon for further information.

PROFESSIONAL
Integrated Spreadsheet
Superbase PERSONAL

£499
INCLUDING VAT

With SM124 mono monitor:	£598 INC VAT	
With SC1224 colour monitor:	£798 INC VAT	

ATARI 1040ST-FM	(Computer)	**£499.99**
VIP PROFESSIONAL	(Spreadsheet)	**£149.95**
MICROSOFT WRITE	(Word Processor)	**£149.95**
SUPERBASE PERSONAL	(Database)	**£59.95**
BASIC DISK & MANUAL	(Language)	**£24.98**
	NORMAL RRP:	**£884.82**
	LESS DISCOUNT:	-£385.82
	PROFESSIONAL PACK PRICE:	**£499.00**

2Mb & 4Mb MEGA ST

The MEGA ST computers are styled as as lightweight keyboard with a separate CPU, connected by a coiled telephone style cable. There are two versions of the MEGA ST, one with 2Mbytes of RAM and the other with 4Mbytes. Each version has a 1Mbyte double sided disk drive built-in to the CPU unit. The MEGA ST's do not come with modulator built-in and must therefore be used with a monitor. With every MEGA ST purchased, we will add the 'Professional Pack' software (worth £384.83) detailed above, plus the Silica ST Starter Kit (worth over £200) both Free Of Charge. Return the coupon for further details.

2Mb MEGA ST	4Mb MEGA ST
£899 INC VAT	**£1199** INC VAT
+mono monitor=£998	+mono monitor=£1298
+colour monitor=£1198	+colour monitor=£1498

DTP PageStream £149 +VAT =£171.35

Desktop Publishing (DTP) is one of the fastest growing applications for personal computers. We are pleased to announce a powerful low cost package for the Atari ST called PageStream. PageStream costs only £149 (+VAT=£171.35) and, because it works with an Atari 1040ST and a Seikosha SP-180AI printer, you can be up and running with a complete system for less than £1000. Some of the features of PageStream are listed to the right. If you would like further information on this program, complete and return the coupon below, ticking the 'DTP' box in the corner.

* TEXT-FLOW AROUND GRAPHICS
* ROTATION OF TEXT & GRAPHICS
* SLANT OR TWIST ANY OBJECT
* POSTSCRIPT COMPATIBLE
* TAG FUNCTION
* AUTO/MANUAL KERNING & HYPHENATION
* GROUPING OF OBJECTS

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ATARI ST

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The range of Atari ST computers offers something for everyone. From the games enthusiast who wants the challenge of the very best in arcade action, to the businessman who wants to make financial forecasts or faultless presentations. The ST offers high quality graphics, sound and speed for the gamer, whilst providing a fast, user friendly and affordable solution to business. The ST is now firmly established in the home environment and boasts a wealth of users in education, local government, television, and a variety of different businesses. Software for the range stretches to cover applications as diverse as ENTERTAINMENT, ACCOUNTS, ART, COMMUNICATIONS, COMPUTER AIDED DESIGN, DATABASES, DESKTOP PUBLISHING, EDUCATION, MUSIC, PROGRAMMING, SPREADSHEETS, WORD PROCESSING and more. For a full list of the software available, as well as details of the ST range, complete and return the coupon below.

All prices correct at the time of going to press. E&OE.

520ST-FM EXPLORER PACK

WITH BUILT-IN 1Mb DISK DRIVE

The value for money offered by the Atari ST range is reflected in the Explorer Pack featuring the 520ST-FM computer with 512K RAM. The 520ST-FM computer now comes with a built-in 1 Mb double sided disk drive as well as a free mouse controller and a built-in TV modulator. The new 520ST-FM Explorer Pack includes the 520ST-FM computer, the arcade game Ranarama, a tutorial program and some useful desktop accessories. In addition, if you buy the Explorer Pack from Silica, we will give you the Silica ST Starter Kit worth over £200, FREE OF CHARGE. Return the coupon for details of our Starter Kit and of the full ST range.

£260

ONLY £2.51 PER WEEK
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+VAT= £299

+ SM124 mono monitor: £398 INC VAT + SC1224 colour monitor: £598 INC VAT

WHY SILICA SHOP?

Before you decide when to buy your new Atari ST computer, we suggest you consider very carefully WHERE you buy it. There are MANY companies who can offer you a computer, a few peripherals and the top ten selling titles. There are FEWER companies who can offer a wide range of products for your computer and expert advice and help when you need it. There is ONLY ONE company who can provide the largest range of Atari ST related products in the UK, a full time Atari ST specialist technical helpline and in-depth after sales support, including free newsletters and brochures delivered to your door for as long as you require after you purchase your computer. That one company is Silica Shop. We have been established in the home computer field for ten years with an annual turnover in excess of £8 million and can now claim to meet our customers requirements with an accuracy and understanding which is second to none. But don't just take our word for it. Complete and return the coupon below for our latest literature and begin to experience the Silica Shop specialist Atari service.

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SOFTWARE FOR THE ARCHIMEDES COMPUTER SYSTEM

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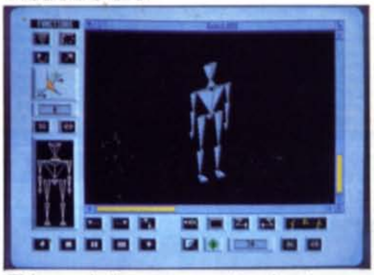

This revolutionary new extension to traditional LOGO, made possible only by the enormous computational power of the Archimedes, provides three dimensional control of an articulated humanoid or animal figure through the use of a standard LOGO language. Sophisticated natural commands such as 'Walking', 'Turning', 'Bowing', and 'Picking', etc are automatically represented graphically by natural movements of the 3D figure. This natural form of graphical response is readily understood by students using LOGO to learn the concepts of logic & reasoning. The traditional Turtlegraphics & 3D Glider features are also supported for easy transition to this innovative concept in natural response LOGO.

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Realtime Solids Modeller

The package includes both the sophisticated design environment of SolidCAD and the high speed capability of a Realtime Graphics Language module to provide the fastest programmable animation facilities bringing any design to life from within your own programs. Facilities include 3D Rotate, Scale, Orbit, Perspective, Position & extensive display styles for wireframes, hidden-surface removal, smooth shading and multiple light sources with individual intensities.

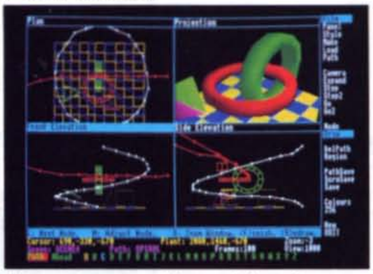
£149.95 (ARC) New

Gate Array Design System

An introductory course for teaching Silicon Chip Design with facilities for Array design, Cell design, On-line Help and a tutorial on integrated circuit design. Ideal as a low cost teaching tool where expensive silicon fabrication facilities are not required.

£89.95 (ARC) New

FILM-Maker



The package provides an interactive environment to create animated sequences of 3D scenes with dynamic camera motion for 'walk-throughs' and 'flight-paths' for objects within the scene. The fully graphical environment requires no programming or textual entry and the capability to calculate smooth shaded frames of complex scenes with lighting effects at very high speeds allows fast interactive design of animated sequences. A large number of these frames can then be stored using built-in compression facilities to play-back at flicker-free rates for on-screen animation or video recording. Fully compatible with SolidCAD and SolidsRENDER, animation Oscars are now within your reach.

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SolidCAD

The next generation multi-tasking CAD package combining 2D Draughting and 3D Modelling techniques with advanced smooth shading and lighting effects to provide the ultimate 3D Draughting System for Architectural design, Interior design, Engineering design and Teaching CDT. Allows drawing in plan, front & side elevations and also directly in 3D to visualise a model while it is being created. Powerful zoom, pan, sweep, extrude and macro facilities are also provided to enhance design productivity.

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SolidTOOLS

The fully integrated environment for 3D CAD, Animation, Rendering & Hardcopy. The package includes SolidCAD, FILM-Maker, SolidsRENDER, Realtime Graphics Language, SuperDump & SuperPlot for a turnkey solution satisfying all your requirements.

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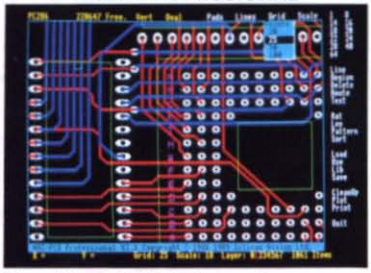
ARC-PCB Professional



The ultimate PCB design package developed specifically for the Archimedes is now even better. ARC-PCB Professional follows on the success of the original and provides Faster & Improved Automatic Routing, Oval & Circular pads with fully variable sizes, Faster Redraw, Extended library part manipulation, & Instant Editing operations for substantially increased productivity. This Professional version operates orders of magnitude faster than the original and surpasses all other PC-based PCB design systems in features & speed of operation for the fastest turnaround from concept to finished board design. Take the lead for your PCB designs before your competitors do.

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SolidsRENDER

The fastest most advanced Ray Tracing package for the Archimedes producing photo-realistic images of SolidCAD designs or FILM-Maker animations which take into account light sources, reflections, shadows, transparencies, refractions and textures for the highest quality pictures from the leading 3D graphics experts renowned for technical excellence.

£79.95 (ARC) New

RiscBASIC

The best BASIC V compiler money can buy. Here's what the reviewers say: "If you are looking for THE compiler to go for, and are confused about which one deserves to win the very public battle that has been raging in the advertisements, well my preference is for RiscBASIC" - RISC USER Aug 1989. "In summary, BASIC V is the best version of BASIC produced and RiscBASIC provides the most compatible, fastest compiler for this language. My congratulations to Silicon Vision" - Archive June 1989. "RiscBASIC wins the race...has the edge overall" - BBC Acorn User Nov 1989. "very useful indeed for development work...produced significantly more efficient code" - Micro User July 1989.

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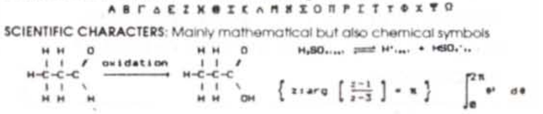

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*"At last, a game that begins to use the 32 bit ARM processor. E-Type, as the name probably suggests, is a road racing game where you are at the controls of that beautiful machine. The author of this excellent product is Gordon Key, who's last product was Holed Out....there's just one word to describe E-Type: **Fantastic.** Graphics 10, Value for Money 10".*
– The Micro User, Dec' 89.

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Thunderstruck	(Solution + map)
Philosopher's Quest	(Solution + map)
Rick Hanson	(Solution)
Thrust	(Maps)
Last Ninja	(Solution + maps)
Hoverbod	(Passwords + cheats)
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The Fourth Dimension

Arcade Soccer really is football action at it's very best.
Using an overhead view to make game play as exciting as possible it features everything that you could want in a football game. Corners, sliding tackles, throw-ins, goal kicks, dribbling, shooting, passing and much more.

All versions work with keyboard or joysticks.
"The game is very playable and you do get a feeling of involvement as you knock the ball into the corner of the net straight past the diving goalie. It's definitely one to play again, and if you've enough friends it could make for a good day of enjoyment - and not a lot of games do that. Value for money...10 out of 10" ***The Micro User Oct '89***

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from Impact Software

An ingenious and comprehensive design program from Impact Software allowing you to create superb pictures and save them to cassette or disc.

It features a host of easy to use commands such as Zoom, Paint, Fill, Copy etc, to help any budding artist. No roms, chips, mice or other add-ons are required. Just load and go! Keyboard or joystick controls. Works in modes 4 & 5. This must be the best value utility on the market today.

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"The 3D perspective graphics are stunning" ***Electron User GOLDEN GAME June '89***
"Holed Out is great.....The game plays very well and the graphics are superb."
Popular Computing Weekly, March 1989
"The best golf simulation I've ever seen on any Acorn machine." ***The Micro User, June '89***
"The Electron version is brilliant - it's almost the same as playing at Gleneagles. Unreservedly recommended."
A & B Computing Game of the Month, June '89

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U.I.M. is disc only and will run on BBC B or B+ with sideways RAM and Master Series Computers.
The fully enhanced Archimedes version is also now available.

"Will I keep playing it the way I've played Elite for years? And the answer is yes. Graphics 10, Playability 10, Value for Money 10" ***The Micro User, Nov' 89.***

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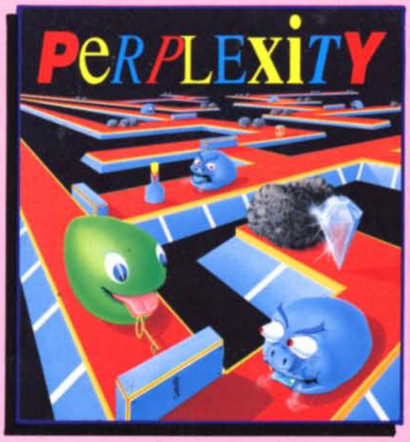

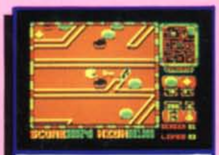
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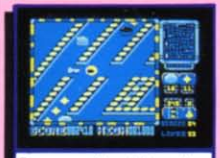

Beware the Monster

PERPLEXITY

3-Dimensional Strategy Game with Brilliant Graphics

PERPLEXITY consists of 16 increasingly difficult levels, each a puzzling maze with one of four different 3D background themes. Collect the diamonds by pushing together the boulders scattered about the maze and push the keys to the correct doors to open them.

But watch out for the monsters who will chase you around the maze. And watch out also for the 'mystery boulders', which may give you a bonus score or a magic potion, but may also reverse some or all of the movement controls...then you've really got problems!

On-screen information includes a constantly up-dating scanner/map, which allows you to plan your route, a score-line and timer/status icons. Passwords allow you to skip completed levels.

PERPLEXITY combines the best puzzling features of REPTON games with superb 3D graphics, to give a highly addictive and visually brilliant game. Are you ready to face the challenge?

(The Electron version has the same graphics as the BBC Micro version.)

PLAY IT AGAIN SAM 12

A New Action-Packed Four-Game Compilation

THE LAST NINJA

The state of the martial arts...fighting with fists, swords, numchukas and shurikens, through six puzzling levels. The top BBC/Electron game of 1989.

"Ninja is fast, furious and totally addictive"...Micro User

SKIRMISH

A brilliant, full-feature version of the classic joust game,with beautifully animated sprites. 1 and 2 player options.

"I can recommend Skirmish whole-heartedly. It is one of the most playable games I have ever seen"...Micro User

BY FAIR MEANS OR FOUL

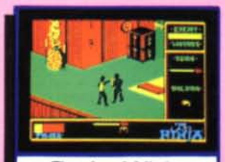
A realistic and entertaining boxing simulation. You can even cheat...if the ref's not looking! Have you the skills and cunning to become World Champion? Keyboard or joystick controls.

"Excellent boxing game"...Micro User

BLAGGER

A new, much-improved version of the classic Alligata Software game, with twenty tricky, but highly amusing levels.

"The game is a winner... very enjoyable, sure to give many hours of entertainment"...Electron User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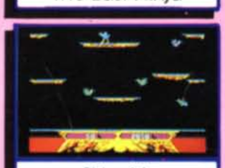
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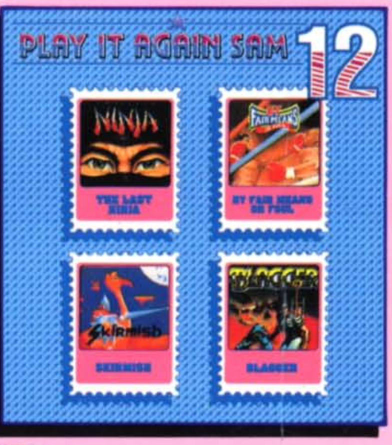

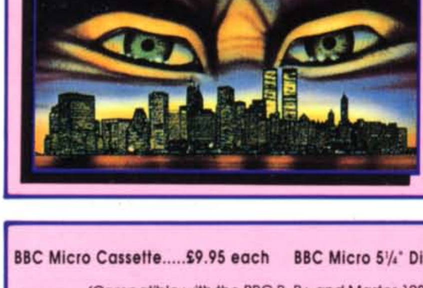

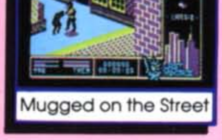
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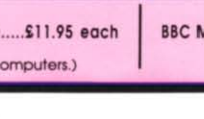
Mugged on the Street

LAST NINJA 2 - Back with a Vengeance!

Born in a time of peace, lived in a time of war; the shadow warrior returns. Leaping the abyss of time he comes to fulfil his destiny!

DATELINE: 1990 **THE PLACE:** Downtown New York
THE QUEST: To destroy the eternal evil........Kunitoki!

Lots more fiendish adversaries, more colourful screens with superb graphics, a score-line, a timer... and lots and lots more exciting Ninja action. Are you ready for the thrills and skills of the Ninja in crime-filled Manhattan? Can you survive the six action-packed levels?

You start in the notorious CENTRAL PARK, with thugs, police and bees to get past, and shuriken stars and hamburgers to collect. Now to THE STREET, littered with down-and-outs and meths bottles. Take care in THE SEWERS to avoid the darkness and the crocodile. On to the forbidding opium factory in THE CELLAR and then to THE OFFICE and a secret computer code. Finally to KUNITOKI CASTLE with its immortal adversaries and the trickiest puzzle of all!

BBC Micro Cassette.....£9.95 each BBC Micro 5¼" Disc.....£11.95 each

(Compatible with the BBC B, B+ and Master 128 computers.)

BBC Master Compact 3½" Disc.....£14.95 each Electron Cassette.....£9.95 each

(The screen pictures show the BBC Micro versions of the games.)

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